Come Walk With Me . . . .

. . . .On a Virtual Tour of the Forest

Teacher's Guide

Virtual Tour of the Forest

The ***Virtual Tour of the Forest*** CD is available from the Virginia Department of Forestry Web Store {www.dof.state.va.us}. The CD and guide can be copied for educational purposes only and can not be copied for resale.

Virtual Tour of the Forest

"Come take a walk through the forest and discover the many fascinating aspects of nature…"

Produced by the Virginia Department of Forestry

ACKNOWLEDGEMENTS

The ***Virtual Tour of the Forest*** program was originally developed to allow Virginia Department of Forestry (VDOF*) Web Page* users to take a virtual walk in the woods to better understand the how and why of sustainable, stewardship forest management. The current program on the *Web Page* was developed through the vision and commitment of Jim Garner, State Forester, to use "cutting edge" technology to educate and inform citizens on forest resource related topics and issues. James Starr, Forest Management Team Coach and David Coffman, Conservation Education Coordinator, served as Project Managers to utilize this new technology, develop the content topics, draft scripts and create the program layout. Virtual Reality technical services were provided by HSMM ARCHITECTS, ENGINEERS, AND PLANNERS in Roanoke. The Virginia Department of Game & Inland Fisheries provided the wildlife images used in the production.

Numerous teachers asked that the *Web Page* program be reproduced as a CD-ROM for direct use in their classrooms as a study guide. This CD and accompanying Teacher's Guide have been developed in response to requests from educators throughout Virginia who partner with VDOF in a number of conservation education activities.

VIRTUAL TOUR OF THE FOREST TEACHER'S GUIDE

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TABLE OF CONTENTS

FOREST STAND SECTIONS

REFERENCE SECTION

INTRODUCTION

PURPOSE

The **Virtual Tour of the Forest** CD is designed and produced with one goal in mind - to educate. The CD uses narration, video, and QuickTime Virtual Reality to see 360 degrees in a forest stand and was developed to allow users to take a *virtual* walk in the woods. Actively engaging student learning will increase understanding of the importance of employing scientific principles to sustainable forest management.

Virtually move through the forest stands to view how and why natural resource professionals manage forest resources. The windows show close-up details of the forest stands and can be viewed from the ground to the treetops, and 360 degrees. Various ages and types of forest stands throughout Virginia are featured with scenes of thinning, harvesting, and reforestation practices used to maintain forest health and productivity. The written script along with the narration aid the user in understanding what they are viewing.

The conservation messages are middle school level and the narrator is a 14 year-old student. There are 13 different forest stand sections that can be explored, including young, middle aged, and old hardwood and pine forests, and special use forests. Additional sections feature riparian forests, forest products, urban forestry, water quality, and fire.

USE IN THE CLASSROOM

The **Virtual Tour of the Forest** ***Teacher's Guide*** is designed to assist the educator in utilizing the CD-ROM. The easy to use format of the guide highlights key concepts, related topics, and student assessments for each of the forest topics. The narrated information presented in the CD-ROM is included in the ***Teacher's Guide*** for your convenience. Suggested activities are chosen from **Project Learning Tree**, **Project WILD**, **Project WET**, **Project Aquatic WILD**, and **Pollution Solutions** to enhance classroom learning and reinforce the topic. Topics are correlated to the **Virginia Standards of Learning**. The guide also contains a sample Project Learning Tree activity, reference list, and glossary to aid you in the classroom. Student assessments for pre and post use of the CD materials are located in the reference section.

For your convenience, the **Virtual Tour of the Forest** ***Teacher's Guide*** is included on the CD in Adobe Acrobat Reader format (guide and reference.pdf).

REQUIRED COMPUTER EQUIPMENT

This CD is both IBM- and Macintosh-compatible. The minimum and recommended system requirements are 486/66 processor or greater, Windows V.3.1 or greater, 8MB RAM, 2X CD-ROM Drive, VGA Monitor Supporting 256 Colors, Sound Blaster or compatible sound card, MS DOS V.6.0 or greater. Your computer must meet these requirements in order to operate the CD program.

DIRECTIONS FOR USING THE VIRTUAL TOUR OF THE FOREST CD

Insert the CD in your CD-ROM drive. Click Start, Run, type e:\ForesTour.exe (replace e: with appropriate drive letter for your CD-ROM drive) in the box next to Open, click OK.

When you open the ***Virtual Tour of the Forest*** program, the window view is the **Introduction**. After listening to the narrator's brief introduction, click on **START YOUR TOUR** in the lower left corner.

The **Main Menu** page will appear. This menu displays the 13 different **Topic Sections** that can be explored. The **Topic Sections** are types of forests, forest management activities or forest related issues that can be explored.

Click on the **Topic Section** you wish to explore. As you go to a **Topic Section**, there will be **VR** [virtual reality] buttons and **VIDEO** buttons that you can click to enter. The **VR Picture Window** can be activated by simply placing your mouse pointer anywhere on the view window inside the VR screen and dragging up, down, right, or left and the view will change 360 degrees, as if you were inside the scene looking around. Narration and captions will describe what you are viewing. The **Video Buttons** [usually wildlife, harvesting, or reforestation segments] will show you a video of wildlife or other forest management activities. The **HELP** button within each topic screen provides instructions on using the virtual reality window.

All the forest management segments end with a message to the listener to always seek professional advice and assistance before attempting forestry and wildlife management practices.

TROUBLESHOOTING

If you experience problems with video, virtual reality or sound, check the following:

You may need to install QuickTime 3.0:

1. On the Forest Tour CD, go to the Q Time 30 folder
2. Double-click on the Windows (WinInstl) or Mac (MacInstl) folder depending on your computer type.
3. Click on the QuickTime executable file (Quick T30.exe for Windows or QuickTime3.0.2. for Mac) to install QuickTime.
4. You may need to contact your system administrator for installation.

Be sure your monitor is set to "640x480" resolution and "thousands of colors" for the best resolution.

Be sure your volume is up on your speakers and in the volume settings on your computer.

If you still experience problems, you may want to copy the CD to your hard drive and run the program from there (the files are approximately 200MB).

Hope You Enjoy Your Virtual Tour Through The Forest!

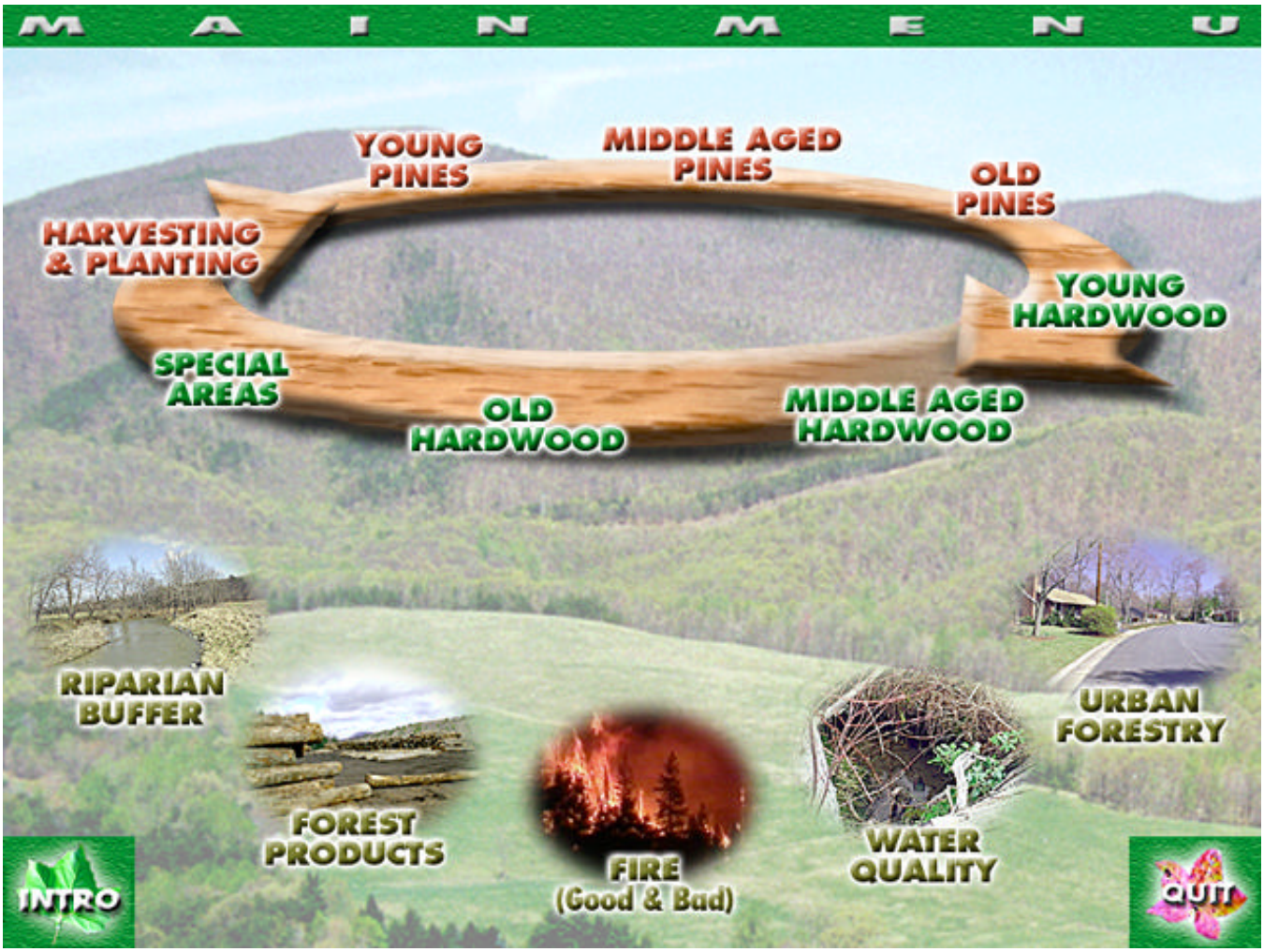
On the following pages, some of the information has been reproduced from the Virtual Tour of the Forest CD. The text and narration has been included in text boxes throughout this guide for your convenience. Additional information including key concepts, related topics, suggested activities, SOL correlations, and student assessments, has been added to supplement the information on the CD, and enhance the educational opportunity.

Virtual Tour of the Forest

Virginia's forests are a renewable natural resource of great importance to all of us. Trees provide both economic value and environmental benefits. Forests moderate our climate, provide clean water and scenic beauty, recreational opportunities, and homes for wildlife. Forests provide jobs, spiritual renewal, and improve our quality of life. Virginia's forests are ever changing... each turn in the path brings new encounters with different plants, insects, and wildlife.

Virginia's forests are diverse... from the extensive loblolly pine forests of the flat, low-lying coastal plain, through the patchwork of pines, interspersed among the hardwood forests of the rolling hills of the piedmont, to the white pine and upland hardwood forests of the western mountains.

Come take a walk through the forest and discover the many fascinating aspects of nature.



In the Southeastern United States, pine trees usually live about half as long as hardwood trees. That is why Virginia's forests either have all pine trees or all hardwood trees. Occasionally pines and hardwoods can be found together ... however all forests are constantly changing as they grow over time. Sometimes the changes are swift as a result of fire, ice, wind, or timber harvest. Sometimes these changes are centipede slow. Choose any forest type to discover how that forest ecosystem developed, how it can be kept healthy, and which animals live there.

Key Concepts:

1. Ecological communities, such as ponds and forests are always changing. **Succession** is the orderly and progressive replacement of plant and animal species through time in a given location.
2. Different tree species have varying levels of tolerance to shade, moisture, slope, and soil fertility.
3. Forest age and tree species are associated with certain wildlife that feed, nest, or find shelter in that specific habitat.

Related Topics:

- In sexual propagation of plants, seeds are dispersed through a variety of mechanisms, including physical structures that enable seeds to be carried by the wind.
- Although they are not listed on the state's threatened or endangered species lists, bobwhite quail populations have experienced a significant decline. Learning about their plight will provide students with insight into what has happened to threatened and endangered species, namely the effects of habitat loss, development patterns, changes in agricultural practices, and the importance of restoring native grasses.
- Young pine forests and their associated herbaceous plants may create an **edge effect**. Numerous wildlife species tend to use areas where two vegetative types meet, due to the diversity of food, shelter, and other habitat components.

3 Year Pine VR

Wildlife Video

YOUNG PINE

The stand in the virtual reality window shows a 3 year old stand of loblolly pine which was hand planted. The area to the right received hardwood control, which makes room for herbaceous growth important to quail and rabbit for food and cover. With good management, planted seedlings will rapidly outgrow the hardwood competition, often exceeding two feet in height growth each year. To the left, the hardwood will soon shade out the important herbaceous plants. Behind you is an 8 year old planted stand of loblolly pine.

Pines are mostly pioneer species – the first trees to seed in on bare ground after a fire or on abandoned fields. Like most oak trees, pine seedlings need full sunlight to grow – they cannot tolerate shade.

Loblolly pine is the most common species found in the Southern part of Virginia. Shortleaf pine and Virginia pine can also be found in Southern Virginia but are more common in Northern Virginia.

Pine trees do not sprout from stumps or roots like many hardwoods. They germinate from windblown seeds or nursery grown seedlings that are planted. Since they originate from seeds on bare soil or are planted, all the trees in a pine stand are usually about the same age.

Almost all of the land in Virginia was used for agriculture crops some time during the past 300 years. The forests we have today became established when the land was no longer farmed.

In many parts of Virginia, the soil will not produce good quality hardwoods but will grow crops of pine timber. Hot, dry, less fertile sites are best for pine tree growth after timber harvesting is completed.

Suggested Project Learning Tree Activities:

 # 80 - Nothing Succeeds Like Succession

After reading an intergenerational story about a family's observations of a particular valley and learning how succession typically proceeds in a forested area, students create overlay drawings on transparencies that show successive phases of growth. Options include taking the class on a field trip where students can try to find plant communities in different stages of succession and recording observations of different areas in the schoolyard. #6 ***Story of Succession*** in the Forest Ecology Secondary Module is a more in-depth version of the same basic lesson plan.

 # 27 - Every Tree For Itself

During an active game, students assume the role of individual trees, each in need of its own sunlight, water, and nutrients. Through several rounds with different arrangements, (i.e. the randomness of the forest vs. tree farms) they discover the likelihood of their survival in each particular environment.

 # 43 - Have Seeds Will Travel

Students bring in a variety of seeds from home or collect seeds in a nearby natural area. After reviewing the form and function of seeds, they sort them into different categories based on dispersal mechanism.

Suggested Project WILD Activities:

Forest in a Jar

Students create a model that illustrates the succession of pond to forest, using a jar, soil, water, aquatic plants, and seeds. Observations of the environmental changes in the jar are recorded and discussed.

Who Fits Here?

After researching different ecosystems and their characteristic life forms, student groups design a matching game using posters and animal adaptation cards.

Here Today, Gone Tomorrow

Students conduct research on several different threatened and endangered species and create posters that illustrate the factors contributing to their decline.

(See Pine Harvesting and Tree Planting and Young Hardwood sections for further activities)

Virginia Standards of Learning Correlations:

Science

6.1, 6.2, 6.8, 6.9, 6.11, LS.1, LS.4, LS.5, LS.7, LS.8, LS.9, LS.10, LS.11, LS.12, LS.14, BIO.1, BIO.5, BIO.7, BIO.8, BIO.9

Additional Activity Idea:

- **Pine Seed Mull** -

  Each student gets one card with the following written on it: pine seed, adequate sunlight, too shady, adequate water, fertile soil, lack of nutrients, soil too wet, toxic soil, too little space, and other conditions that would inhibit or encourage germination. Limit the number of pine seeds to 2-3 per average class. Instruct the students not to reveal what's written on their card. Designate a small space in the playing area to be the germination zone. Have the students mull around in a somewhat circular fashion. Periodically, call "Stop" and check the cards of the students in the zone to see if everything needed for germination is present. Re-distribute the cards and play a few more rounds. Discuss the odds of germination occurring in different settings.

Student Assessment:

In small groups, have students arrange pictures of different stages of succession in their typical sequence. Pictures for several different plant and animal species can be placed in the group (stage) they are associated with most closely.

Key Concepts:

1. Interactions exist among members of both plant and animal communities. **Competition** results when organisms are dependent on a limited quantity of the same resource.
2. Trees and other plants that are under stress from overcrowding are more susceptible to disease.
3. A common forest management and horticultural technique is to **thin** (remove the smaller trees that aren't thriving) so more sunlight energy, water, and nutrients are directed to the larger, healthier trees. This results in a higher yield of timber, fruit, etc.

Related Topics:

- Trees, particularly fast growing species, are considered a **renewable resource**, a naturally occurring raw material or form of energy that has the capacity to replenish itself through ecological cycles and sound management practices. **Non-renewable resources** by contrast, can't be replaced in this geological age.
- In a broad sense, **carrying capacity** is the number of plants or animals any area of land or water can support at any one time.
- Many species of wildlife, including several songbirds rely on middle age forests for food, cover, or nesting sites.

Unthinned Pine VR

Thinned Pine VR

Wildlife Video

MIDDLE AGED PINE

When pine stands reach an age of 16 to 20 years, they need to be thinned. The thinning removes the smaller and poorer quality trees and leaves more room for the best trees to develop.

Thinning also keeps the stand growing vigorously so it is less susceptible to bark beetle attack. In stands which are not thinned, the smaller trees will be crowded out and die. The virtual reality shows many trees which have already died.

The pine trees cut in the thinning are sold as pulpwood and are used for making paper and chip board.

A heavy thinning in pine can greatly improve the habitat by opening the forest floor to more sunlight, which accelerates the growth of herbaceous plants like huckleberries, grasses, and succulent shrubs. This new growth also provides cover and nesting habitat for many animals.

Suggested Project Learning Tree Activities:

#3 - The Nature of Plants (Forest Ecology Module)

Part A - Students compile a list of what is necessary for plant growth and then attach small circular or square pieces of stiff paper to green leaves. After several days, they remove them and observe the effect of light-deprivation.

Part C - Using bean sprouts, student teams design and conduct a variety of experiments that demonstrate the effects of light deprivation and the lack of soil and water on plant growth.

Part D - Student teams conduct experiments that demonstrate a variety of factors contributing to plant stress, including crowding.

#1 - Renewable or Not? (Introductory Handbook for the Secondary Modules)

Student teams work together to define renewable, non-renewable, and perpetual resources and categorize a list of examples. Then, they participate in three demonstrations that illustrate how the supply of renewable resources can be maintained if consumption is limited, how quickly nonrenewable resources can be depleted if consumption is unchecked, and the discrepancy between the world's population and consumption of natural resources.

#51 - Make Your Own Paper

Students make recycled paper from scrap paper, identify the inputs and waste products, and make comparisons with commercial industry.

 # 3 - Trees As Habitats (Introductory Handbook for the Secondary Modules)

Using hand lenses, binoculars, and other equipment, students explore a stand of trees, taking inventory of the plants and animals living on, in and around the trees. Data is organized by type of organism, location on the tree, whether the organism only visits or remains on the tree, and if a positive or negative impact has occurred.

Suggested Project WILD Activity:

Carrying Capacity

In relay fashion, student teams (herds) must attempt to survive by obtaining enough (of a fixed quantity of) food. After a percentage of students have "died", the class discusses what could be done to increase the area's carrying capacity. In subsequent rounds, various options are incorporated included adding (planting) more food and decreasing the number of animals (relocation, hunting, etc.) Results are compared.

(See Middle Aged Hardwood section for further activities)

Virginia Standards of Learning Correlations:

Science

6.1, 6.2, 6.8, 6.9, 6.11, LS.1, LS.4, A LS.6, LS.7, LS.8, LS.9, LS.11, LS.12, ES.7, BIO.1, BIO.5, BIO.7, BIO.8, BIO.9

History and Social Science

WH1.9b, WH1.10.b, WH11.6g, WH11.8a

Additional Activity Ideas:

- Students can experience the intricacies of nest building by assembling their own nest using the same materials available to birds (grass, pine needles, straw, small twigs, feathers, mud, horse hair, etc.) To test their durability in inclement weather, the students' nests can be "rained on" or "blown down" (tossed from an elevated position).
- Bird beaks, feet, and feeding habits provide excellent examples of animal adaptations. Matching games (i.e. bird to its food source) can be set up using bird pictures or models and an assortment of props or food sources written on cards. *Fill the Bill* in Shelburne Farm's Project Season book (ISBN 0-9642163-0-2) is another activity.

Student Assessment:

Students research alternative (renewable or perpetual) energy sources and illustrate their understanding of the technology, advantages, and disadvantages involved, by giving a brief oral report.

Key Concepts:

1. All organisms experience a life cycle typically consisting of germination or birth, growth, reproduction, and death.
2. Mature trees provide numerous benefits to humans, wildlife, and the forest ecosystem itself. Atmospheric oxygen, insulation from temperature extremes, wood products, fuel, recreational sites, wildlife food and cover, erosion prevention, and nutrient recycling are among these benefits.
3. When a tree dies, its nutrients are returned to the environment through **decomposition**. Wood-eating insects, arthropods, and other animals, as well as fungi and bacteria hasten the process. As a group, these organisms form the decomposer link in the **food chain**.

Related Topics:

- Virginia's forests industry harvests millions of board feet of lumber of white pine and loblolly pine annually. White pine wood is used in construction, shelving, paneling, and pallets, while the coarser-grained loblolly wood is made into other construction products, veneer, and pulpwood.
- In **mutualism,** two different species live in a symbiotic way where both benefit and are dependent upon the relationship. When one species derives food or shelter from another without harming or providing any benefit to the other, it's referred to as **commensalism.** In **parasitism,** one species (the parasite) nourishes itself to the detriment of the host species.

Old Pine VR

Wildlife Video

OLD PINE

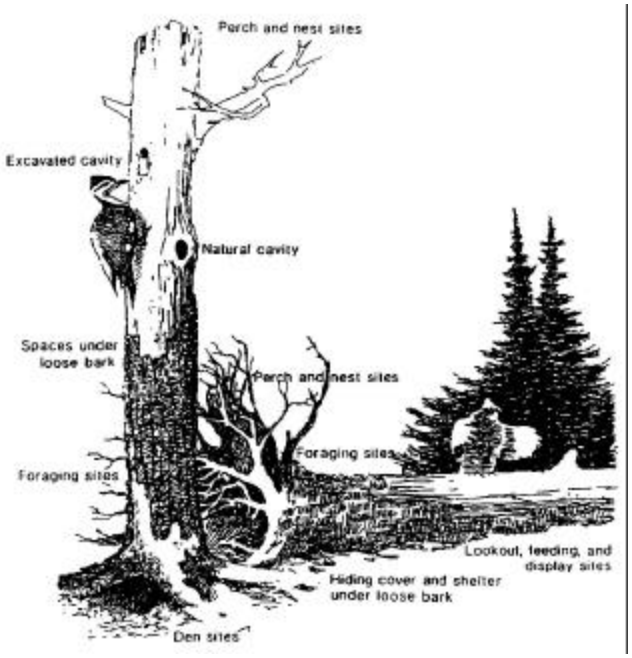
This pine stand was planted in the 1950's and has been thinned twice. It is mature and its growth and health are beginning to decline.

When trees are mature they will become susceptible to insects and diseases and start to die. This is the time to harvest the trees and start a new, young, vigorous forest.

Dying trees attract insects which provide food for birds. Tree cavities provide shelter for animals such as squirrels, raccoons and opossum.

As the wood decays, fungi and bacteria break down the organic matter and nutrients are released from the wood and work their way into the soil.

The nutrients are recycled and used by different plants. The plants compete for available nutrients, which means nutrient recycling in a forest ecosystem is very important.



Suggested Project Learning Tree Activities:

#79 - Tree Lifecycle

Students use art materials to create representations of the lifecycle of a particular tree species, with particular attention to transitional conditions or events. The class visits a forested area and attempts to locate trees in each of the main stages.

#23 - The Fallen Log

Teams of students explore decaying logs, making and recording observations on the plants and animals supported by them. Inferences on the reason for the tree's death and the rate of decomposition are also made.

#67 - How Big is Your Tree?

The methods professional foresters use to calculate timber yield and make other types of management decisions are discussed. Using increasingly complex methods, students take measurements or make estimations on a tree's needle/leaf length, circumference, crown spread, and height.

#26 - Dynamic Duo

Students learn several examples of symbiotic relationships by matching fictitious want ads (describing what kind of partner is needed) with descriptions of wildlife species.

Suggested Project WILD Activities:

Time Lapse

As individuals or groups, students use the medium or their choice to portray a natural phenomenon (such as the aging of a forest, erosion, seasonal changes, plant or animal adaptations) over time. Still photography (both those taken by students and old photographs located from other sources), video, power point presentations, drawings, collage, sculpture, mime, or other dramatic interpretations are among the possibilities.

Eco-Enrichers

The class conducts an experiment of how organic matter (i.e. plant litter) and earthworms affect soil fertility and plant growth.

(See Old Hardwood section for further activities)

Virginia Standards of Learning Correlations:

Science

6.1, 6.2, 6.8, 6.9, 6.11, LS.1, LS.6, LS.7, LS.9, LS.11, LS.12, LS.14, BIO.1, BIO.3, BIO.9

Mathematics

6.1, 6.2, 6.6, 6.7, 6.9, 6.10

Additional Activity Ideas:

- When visiting forested areas, have students examine mature trees, snags, fallen branches, and decaying logs for sources of wildlife food (i.e. soft mast, woodpecker holes) and possible shelter (i.e. brush piles, tree cavities, the hollow of logs)
- Pines and other conifers play an important role in history, mythology, and folklore. Chapter 8 *Why Some Trees Are Always Green* of Keepers of Life: Discovering Plants Through Native American Stories and Earth Activities for Children by M. Caduto and J. Bruchac (ISBN 1-55591-186-2) contains several activities related to coniferous forests.

Student Assessment:

Provide students with an outline drawing of a fallen log and ask them to fill in the details (using a combination of drawings and labels) so that the importance of decaying logs is illustrated.

Key Concepts:

1. **Secondary succession** is the sequential development of communities in an area in which natural vegetation has been removed but the soil is not destroyed.
2. In **asexual propagation,** a vegetative part (root, stem, or leaf) of the parent plant regenerates itself into a new plant. Genetically, it is identical to its one parent.
3. Organisms within an ecosystem are dependent on the other living (**biotic**) and nonliving (**abiotic**) components of the environment.
4. The **dominant** species in a community may be the most numerous, have the largest biomass, occupy the most space or by some other means control, or influence the rest of the community. In forests, the dominant tree species influences the amount of light, moisture, soil structure and its chemical composition, as well as the type of food and cover available for wildlife.

Related Topics:

- Numerous game and non-game species depend upon young hardwood forests at some point in their life cycle.
- Clearcutting is the most efficient method of regenerating shade intolerant tree species that are rich sources of food and cover for wildlife.
- **Hardwood** trees are **deciduous** plants that periodically shed all their leaves. Most North American broadleaf trees are deciduous.

Young Hardwood VR

Wildlife Video

YOUNG HARDWOOD

This stand of hardwood trees is 3 years old. When a hardwood forest is disturbed by fire, insects, disease, or timber harvest, young hardwood stands will develop naturally.

All the hardwood trees were harvested from this site 3 years ago using the clearcut method – where all the trees are harvested at one time. The new stand of trees has developed from stump or root sprouts and seeds from the trees of the previous stand.

The clearcut is one of the most successful methods of reproducing hardwood forests where white oak regeneration is desired.

A forest is a busy place with the interaction of plants, trees and many different animals. Things are always happening in the forest. In this forest ecosystem all the living organisms, both plants and animals interact with each other and with the soil and climate. Plants and animals grow and die in the ever-changing circle of life.

The dominant plants in the forest ecosystem are trees and they greatly influence all the other plants and animals.

Each age of forest and tree species have a variety of wildlife which nest, feed, or seek shelter in that specific habitat.

Specific animals and birds can be found in very young stands where the sun hits the ground and herbaceous plants thrive.

This vigorous plant growth provides food and cover for quail, wild turkey, and rabbits. Song birds like the blue bird nest and feed in these open areas where insects and seeds abound.

Suggested Project Learning Tree Activities:

#48 - Field, Forest and Stream

Teams of students explore and compare three different types of ecosystems, field, forest, and stream. Data is collected regarding soil moisture, amount of sunlight, wind, temperature, and plant and animal life.

 # 45 - Web of Life

Working in pairs or teams, students research selected forest organisms (so that at least two mammals, birds, reptiles, trees, and other plants are covered.) The class creates a forest mural with all the necessary biotic and abiotic components. Each group places their organism in the location (habitat) where it would likely be found and the class constructs a "web of life" with push pins and yarn to illustrate predator-prey and other inter-relationships.

#68 - Name That Tree

After discussing the common methods used to identify tree species (leaf characteristics, alternate vs. opposite branching, bark color and texture, fruit and flowers, silhouette, etc.) students use cuttings or drawings and a list of clues to locate several different species of trees.

Suggested Project WILD Activities:

What's For Dinner

Students create a flow diagram of where their food comes from which illustrates how all animals are ultimately dependent on plants.

My Kingdom for a Shelter

After researching the characteristics of a wildlife species, students construct representative shelters using the natural materials available to that animal.

Bird Song Survey

Using field guides, recordings of birdcalls, and possibly the assistance of a local bird watcher, the class takes an inventory of common bird species at a natural area. Seasonal comparisons can be made. Classes can participate in national studies through Cornell University Lab of Ornithology's Nest Box Network (www.birs.cornell.edu). North American Bluebird Society (www.nabluebirdsociety.org) offers a free teachers education packet.

(See Young Pine section for further activities)

Virginia Standards of Learning Correlations:

Science

6.1, 6.2, 6.8, 6.9, 6.11, LS.1, LS.4, LS.5, LS.6, LS.7, LLS.9, LS.10, LS.11, LS.12, LS.14, BIO.1, BIO.5, BIO.7, BIO.8, BIO.9

Additional Activity Ideas:

- Obtain information on the nesting habits and nest box specifications for different species of birds including blue birds. Design a game where students "fly" from tree to tree (other students) to see if they can find a suitable nesting situation. Tree-students can "wear" different size cavities made from poster board or hold signs that describe their trunk and branches. Bird-students can carry rulers to help determine if a particular cavity or tree fits their needs. Adaptable species should flourish while species with more specific nesting should have more difficulty.

Student Assessment:

An expanded version of *My Kingdom for a Shelter* can be used as an assessment. Students can use art materials to draw or construct a model of the habitat for a particular wildlife species. Selections can be made from a list of wildlife species associated with forests of varying age and type.

Key Concepts:

1. A well-developed forest **ecosystem** has several layers of vegetation including the canopy, understory, shrub, or herbaceous layer and forest floor. Each layer is inhabited by its own characteristic organisms. In general, the more stratified the forest, the more diverse the wildlife dwelling there.
2. **Bio-diversity** can be promoted by periodically taking out the less desirable, less valuable trees, which allows sunlight to reach the understory and herbaceous layers.
3. Hardwood trees that produce nuts **(hard mast)** such as oaks, hickories, and black walnuts are an important source of food for a variety of wildlife.

Related Topics:

- Lumber, wood furniture and paper are commonly known tree products but a large assortment of less known products are made from wood fiber, bark, and sap.

Middle Aged Hardwood VR

Timber Stand Improvement VR

Wildlife Video

MIDDLE AGED HARDWOOD

This hardwood stand is about 40 years old and has not received any improvement treatments. Squirrels nest and feed, turkeys roost, and deer eat the acorns and tiny tender twigs called browse. Some species of birds live in the tree canopies and other species favor the growing brush.

Piedmont forests usually include various species of oak and hickory, yellow poplar, red maple, sweet gum, black gum, and other dominate species. The understory will include dogwood, hackberry, and many other species.

This hardwood stand is about 40 years old and has received timber stand improvement treatment. This treatment also improves the wildlife habitat for many species.

When a timber stand improvement cut is made the forest is opened up to allow sunlight to hit the forest floor, which in turn allows herbaceous plants to grow. These plants provide food and cover for a variety of wildlife, and the stumps will sprout and provide browse for deer. The remaining trees have room to grow and will have better crops of acorns and hickory nuts, which are eaten by squirrels, turkeys, and deer. Some species of birds live in the tree canopies and other species favor the low growing brush.

Middle age hardwoods can be improved by a timber stand improvement cut which takes out the less desirable and less valuable trees, leaving the best trees. The trees removed during this cut could be used for firewood, pulpwood and other products with smaller, poor quality wood.

Suggested Project Learning Tree Activities:

#1 - Adopt – a – Forest (Forest Ecology Module)

The class "adopts" a forested area to study. During a series of visits, students determine the degree of forest stratification and complete an inventory of woody and herbaceous plants, as well as animal life.

#1 - What's a Forest to You? (Focus on Forests Module)

Students complete a survey designed to increase their awareness of what forests provide and the complexity of related issues. Follow up with small and large group discussions on students' preferences and values. The lesson concludes with students designing and administering their own survey (on the topics that interest them most) and writing a report.

#6 - Squirrels vs. Scopes (Focus on Forests Module)

Students read background information and two different editorials on the proposed building of an observatory on Mt. Graham, home to an endangered squirrel and Native American ceremonial site. A class discussion or debate follows, during which time students identify key points on each side of the issue, biases, and potential compromises.

Suggested Project WILD Activities:

Turkey Trouble

Using provided data on linear and exponential growth, students calculate and graph the size of the turkey population in Wyoming for five years.

History of Wildlife Management

Students conduct research and send a letter or inquiry to the local, state, or federal agency responsible for managing wildlife populations in their community (or interview one of its employees.) Information on the agencies philosophy, objectives, major programs, recent changes or obstacles, funding, etc is collected and presented to the rest of the class.

Pro and Con: Consumptive and Non-consumptive Use of Wildlife

Students brainstorm a list of ways wildlife are used by people and establish a definition of consumptive use (when animals are fished, hunted, trapped) versus non-consumptive use (when animals are studied or enjoyed, i.e. bird-watching, hiking, sketching, photography). Students volunteer to represent both sides during a debate on whether both types of wildlife consumption should remain.

(See Middle Aged Pine section for further activities)

Virginia Standards of Learning Correlations:

Science

6.2, 6.2, 6.8, 6.9, 6.11, LS.1, LS.4, LS.6, LS.7, LS.8, LS.9, LS.11, LS.12, LS.14, BIO.1, BIO.5, BIO.7, BIO.8. BIO.9

Mathematics

6.18, 6.21, 6.22, 7.21, 8.13, 8.18

Additional Activity Idea:

- Assign each student or group a wildlife species, and ask them to research the food (i.e. hard mast, berries, browse) and shelter (i.e. canopy, hole in the ground, understory) preferences and present the information to the class. Arrange assorted wildlife foods or items to represent them on a table. Hang a large outline of a forest (showing the different layers or life zones). Give each student a picture of their animal and have them select a food from the table that it would eat and then tape their picture on the forest outline at the layer where it live. The 4-H **Wildlife Habitat Evaluation Program** manual at your local Virginia Cooperative Extension office is a comprehensive resource.

Student Assessment:

Using the basic premise in #79 *Tree Lifecycle* from **PLT**- have students select a hardwood species and discuss its benefits to humans and/or wildlife at various stages of its life.

Key Concepts:

1. All organisms experience a life cycle typically consisting of germination or birth, growth, reproduction and death.
2. Mature trees provide numerous benefits to humans, wildlife, and the forest ecosystem itself. Atmospheric oxygen, insulation from temperature extremes, wood products, fuel, recreational sites, wildlife food and cover, erosion control, and nutrient recycling are among the benefits.
3. When a tree dies, its nutrients are returned to the environment through decomposition. Wood-eating insects, arthropods, and other animals, as well as fungi and bacteria hasten the process. As a group, these organisms form the decomposer link in the **food chain.**

Related Topics:

- Mature, especially old-growth trees provide fine-grained, often defect-free wood that is strong for its weight. High quality wood is used for furniture and for construction in areas where it will be visible, such as for moldings, window and door frames.
- Controversies surrounding the harvest of mature trees on both public and private lands exist throughout the United States and other countries. A thorough understanding of natural succession and the growth requirements of particular tree species is important when making decisions.

Old Hardwood VR

Deferment Cut VR

Shelterwood VR

Clearcut VR

Wildlife Video

Harvesting Video

OLD HARDWOOD

This hardwood stand is 80 to 100 years old. At this age hardwood trees in the southeastern United States are less vigorous and may be more susceptible to insects and disease. Having a diversity of forest types and ages keeps the forest healthy, helps reduce insect and disease problems, and benefits a variety of wildlife.

All plants and trees eventually die. Forests can be kept healthy and growing through proper management. Occasionally this includes harvesting older trees or forests to make room for younger healthier ones.

Having a diversity of forest types and ages benefits a variety of wildlife. When forests are mature and are harvested the primary consideration should be creating conditions favorable for the development of a healthy new stand of trees. Mature stands can be harvested in several ways depending on the tree species, site conditions, and landowner's objectives.

DEFERMENT

The deferment cut looks like a park with about 20 large trees per acre remaining. If the landowner does not want to clearcut, but wants to regenerate trees requiring full sun like white oaks, then this is the type of harvest to keep the forest healthy and growing. The 20 large trees will be harvested about 40 to 50 years later with the timber stand improvement harvest cut. Opening the forest improves wildlife habitat and growing conditions for the remaining trees.

SHELTERWOOD

Forests can be regenerated by removing all but the best 40 to 60 trees and cutting the smaller, more poorly formed trees in what is called a shelterwood cut.

When scattered large trees are left in a shelterwood cut, some tree species which are intermediate shade-tolerant trees such as northern red oak are favored. These large trees will be harvested after the new stand of saplings is established, in 5 to 10 years.

CLEARCUT

This stand of hardwood trees is three years old. When a hardwood forest is disturbed by fire, insects, disease, or timber harvest, young hardwood stands will develop naturally. All of the hardwood trees were harvested from this site three years ago using the clearcut method – where all the trees are harvested at one time. The new stand of trees has developed from stump or root sprouts and seeds from the trees of the previous stand. The clearcut is one of the most successful methods of reproducing hardwood forests where white oak regeneration is desired.

The forest is a busy place with the interaction of plants, trees, and many different animals. Things are always happening in the forest.

In this forest ecosystem, all the living organisms, both plants and animals, interact with each other and with the soil and climate. Plants and animals grow and die in the ever-changing circle of life.

WILDLIFE

As trees die they attract insects which provide food for birds. Cavities provide shelter for animals such as squirrels, raccoons, and opossums. As wood is broken down by fungi and bacteria, the organic matter and nutrients are released from the wood and work their way into the soil. The nutrients are recycled and used by different plants. The plants compete for available nutrients, which means nutrient recycling in a forest ecosystem is very important.

HIGH-GRADING

Selective cutting of the large trees, in mature stands leaves poorer quality and less valuable trees for the future. This type of cutting is called "high-grading" and is often done because of a higher immediate profit and not realizing partial harvest usually favors red maple and other less valuable species. A forester should be contacted to provide proper management recommendations.

HARVESTING

Managing forest resources with sound advice from a professional forester is necessary to maintain overall forest health. Additional environmental values and economic benefits such as clean air, pure water, recreation opportunities, wildlife habitat, scenic beauty, and quality of life are sustained with wise management.

Help is available from the Virginia Department of Forestry. Our mission is to protect and develop healthy, sustainable forest resources for you.

Virginia Standards of Learning Correlations:

Science

6.1, 6.2, 6.8, 6.9, 6.11, LS.1, LS.6, LS.7, LS.9, LS.11, LS.12, LS.14, BIO.1, BIO.3, BIO.9

Additional Activity Ideas:

- **#2 - *Old-Growth Forests*** and **#3 - *Tough Choices*** (**PLT** Focus on Forests Secondary Module) After reviewing the definition of 'old-growth' and the components of an environmental issue, students analyze several articles written from different perspectives. Students create a newspaper that covers a wide range of views and identify solutions to a variety of forestry related issues.
- See *Old Pine* section for further activities

Student Assessment:

Students can be assessed both individually and as a team member as they produce the newspaper or explain the rationale behind their proposed solutions (while completing the **PLT** activities described above.)

Key Concepts:

1. The structure and scale of the natural resources in a given location impact the environmental, economic, and recreational value of the surrounding area.
2. A standard Best Management Practice (BMP) for farmers, land developers, and transportation engineers is to preserve or establish forested buffers along waterways, large construction projects, and highways.
3. These special use forests decrease noise, moderate temperature, prevent erosion, serve as wildlife corridors, and provide numerous other benefits.

Related Topics:

- An ecotone, a zone where two ecosystems overlap may be more complex and biologically diverse than either of the surrounding areas, providing the zone is of sufficient size.
- Human activities may impact wildlife migration patterns. The preservation of wildlife corridors is one practice that can help lessen the impact.
- Certain species of fish, aquatic insects and other macro-invertebrates require cooler water temperatures and a relatively high degree of water quality. Forested buffers increase the likelihood of such species being present in adjoining waterways.

SPECIAL USE FOREST

Small areas of forest in special locations can have a big impact on the environmental values of a larger landscape or ecosystem.

Forest buffers, which are narrow borders of trees preserved along streams and rivers, or beside roads, or adjacent to open or developed areas, provide numerous benefits to the quality of life for both people and wildlife.

Forest buffers provide a diversity of habitats beneficial to a variety of wildlife species. Animals and birds use these special forest areas at different stages in their growth and in different seasons for food supply, nesting, and raising young, as protected travel corridors, and cover for survival. Often these border areas provide basic habitat needs during critical times such as bad weather or when food is not available.

Clean water is an important forest product. Forest buffers maintained along watersheds or restored in agricultural or developed areas provide tremendous benefits in filtering runoff and preventing erosion, which improves water quality for aquatic life and societal needs. Shading streams and moderating water temperatures is critical for many fish and aquatic organisms.

Buffers are valuable for numerous other benefits including slowing flood waters, enhancing aesthetics, stopping the spread of wildfire, providing recreation opportunities, or protection of endangered species and habitats.

Suggested Project WILD Activity:

Migration Barriers

In small groups, students create murals that illustrate a deer herd's migration route from the mountains to a valley. All required habitat components and potential obstacles should be included. Students are then tasked with selecting the route for a proposed highway that would have the least negative impact on the area and wildlife travel corridor they have drawn.

Suggested Project WILD Aquatic Activities:

The Edge of Home

This activity can be modified slightly to focus on the topic of forested buffers. The lesson plan directs teachers to take the class to a place where two different types of ecosystems overlap (an ecotone) and to complete a biological (plant and animal) survey of the three areas (the two distinct ecosystems and the overlapping zone.) In this case, a forested stream bank or marsh edge could be selected as a study site. The investigation should reveal that if the ecotone or forested buffer is of sufficient size it will support diverse life forms.

Fishy Who's Who

Students research the habitat preferences/requirements of approximately five different fish species. Special emphasis can be placed on species that are particularly sensitive to changes in water temperature, dissolved oxygen levels, and other water quality factors. A community map can be used to identify the most likely locations various fish species could be found.

Suggested Project WET Activity:

Just Passing Through

Students compare the rates at which water flows down slopes with and without plant cover in this multi-part lesson. While playing a field game, students assume the roles of plants and water droplets and discover how vegetative cover filters water and slows erosion. The lesson concludes with a discussion of several different Best Management Practices.

(See Riparian Buffers and Water Quality sections for further activities)

Virginia Standards of Learning Correlations:

Science

6.1, 6.2, 6.9, 6.11, LS.1, LS.4, LS.5, LS.7, LS.10, LS.12, LS.14, ES.7, ES.9, BIO.1, BIO.3, BIO.5, BIO.9

History and Social Studies

WG.2a,b&c, WG.11a,b&C, WG.11

Additional Activity Ideas:

- Completing a stream survey as a part of a unit on how forests and other vegetative cover impact water is a beneficial learning experience. Several organizations and curricula provide how-to information, including: local Soil and Water Conservation Districts www.vaswcd.org.
- Virginia Cooperative Extension www.ext.vt.edu, Save Our Streams www.saveourstreams.org, and Virginia Institute of Marine Science www.vims.edu.
- *Water Canaries* in **Project WILD Aquatic**, *Wet n' Wild* activity in **WOW! The Wonders of Wetlands**, and *Catch A Class Act* in **Virginia State Parks. Your Backyard Classrooms** (contact your closest state park) also contain useful lesson plans.

Student Assessment:

Students use art materials to design a construction site or an agricultural or industrial waterfront area where a variety of BMPs have been put in place.

Key Concepts:

1. Different tree species have varying levels of tolerance to shade, moisture, slope, and soil fertility.
2. Forests can be managed with specific goals in mind, such as timber production, wildlife habitat improvement, and erosion control. Through harvesting, thinning, prescribed burning, and planting, the variety and age of trees, the density of trees, the different layers of vegetation, and amount of light can all be manipulated.
3. Management technologies, when appropriately applied can enhance and extend the usefulness of the forest and the quality of the surrounding environment.

Related Topics:

- The field of natural resource management, including forestry, offers a variety of careers.
- Genetically improved tree seedlings, with superior growth rate, greater disease resistance and higher quality grain have been developed. **Bio-engineering,** the process of developing genetically improved crops is a controversial practice with many benefits and risks to be studied.
- Pine seedlings, one of the most commonly planted species due to availability and cost, require full sun. For other tips on how to make a tree planting project successful, contact Virginia Cooperative Extension's 4-H Forestry Project www.fw.vt.edu/4h or Virginia Department of Forestry, www.dof.state.va.us.

Harvesting Video

Planting Video

PINE HARVESTING AND TREE PLANTING

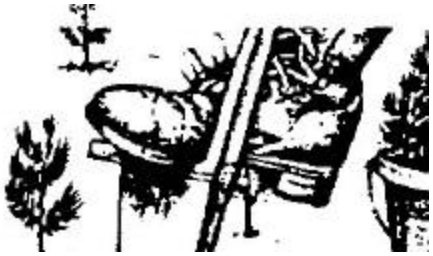
Landowners should seek professional forestry assistance to determine when to harvest and how to maintain a healthy forest. This kind of assistance with the timber sale can significantly increase the income to the landowner from the sale.

There should be a written contract to avoid misunderstandings. A forester can provide additional information on marketing the timber and timber sale contract considerations.

A forester can determine which tree species is best for the soil and the site. If the site is best suited for pine, then the area can be planted with genetically improved tree seedlings grown locally at Virginia tree nurseries.

If the site is suited to growing quality hardwoods the forester can prescribe forestry practices to manage for hardwood species and improve the health and productivity of a new forest.

The future of the forest depends on the decisions you make today. With a commitment to conservation and wise management advice from a professional resource manager, forest landowners can sustain the environmental values, quality of life, and economic benefits provided by our bountiful forests.



Suggested Project Learning Tree Activities:

 # 69 - Forest For The Trees

The students role-play trees on a tree farm, over the course of several years. After most are harvested for pulpwood, the rest are eventually removed for development. After being "replanted," the class discusses alternative management plans that may have a more desirable outcome.

#5 - 400 Acre Wood (Introductory Handbook for the Secondary Modules)

After developing a list of uses for forestland, students identify those that are compatible and potentially incompatible. In small groups, they develop a management plan for their own 400 acres of land and complete a cost and benefit analysis of their proposed plan.

#10 - Improve Your Place (Introductory Handbook for the Secondary Modules)

Students survey the schoolyard or other nearby area for signs of damage or neglect such as erosion, soil compaction, or excess litter. After construction a map of the area, they brainstorm on ways to improve it. The class then develops an action plan for a feasible improvement project and implements it. Projects can be simple (i.e. trash pick-up and flower, shrub or tree planting) to more complex (i.e. developing a schoolyard wildlife habitat and study area.)

Suggested Project WILD Activities:

Planning for People and Wildlife

Students research the natural history of their community, before the time it was first developed and note any negative environmental impacts. In small groups, they design (and construct a model of) a community in which people live and work with the least possible negative impact on the existing vegetation, air quality, water, soil, and wildlife.

Improving Wildlife Habitat in the Community

Essentially the same activity as *Improve Your Place* from **PLT**, with an increased focus on the habitat requirements of specific wildlife species.

(See Young, Middle Aged and Old Pine sections for further activities.)

Virginia Standards of Learning Correlations:

Science

6.8, 6.9, 6.11, LS.4, LS.6, LS.7, LS.9, LS.11, LS.12, LS.13, BIO.7, BIO.8, BIO.9

History and Social Science

CE.3e, WG.2a,b&C, WG.11a,b&c

Additional Activity Ideas:

- Teaching resources related to tree planting are available from the National Arbor Day Foundation www.arborday.org or 402-474-5655.
- For information on developing a schoolyard habitat contact the National Gardening Association www.garden.org, National Wildlife Federation www.nwf.org, and Virginia Cooperative Extension www.ext.vt.edu. The Virginia Department of Game & Inland Fisheries, 804-367-6989 has information on **WILD School Sites**, a supplemental program of **Project WILD**.
- Virginia Department of Forestry www.dof.state.va.us sells tree seedlings and seed mixtures for wildlife plantings.

Student Assessment:

Students complete a basic landscaping plan for their yard or an open area near their home that demonstrates their knowledge of tree and other plant's growing requirements (soil type, shade, space requirements, etc).

Key Concepts:

1. Riparian buffers help prevent eutrophication, the enrichment of soil and water due to the runoff of nitrogen and phosphorus from sewers, fertilized farm fields, lawns and other sources.
2. Many waterways experience **nutrient loading**, the influx of high levels of nitrogen and phosphorus, which can cause massive algae blooms. When the large quantities of algae decay the water is depleted of oxygen and the more sensitive aquatic organisms are adversely affected.
3. Riparian buffers also provide protection from flooding, wildlife habitat (including travel corridors) and recreational sites for people.

Related Topics:

- Where forested cover is maintained, streams are fed gradually by subsurface flows of relatively clean water and aquifers are recharged by deep infiltration.
- A **watershed** is the entire land area from which surface runoff drains into a stream, river, or other body of water. Of particular concern in Virginia, is the protection of the Chesapeake Bay watershed. A map of Virginia watersheds can be obtained from the Virginia Department of Conservation & Recreation www.state.va.us/~dcr/.

Riparian Video

Wildlife Video

RIPARIAN BUFFERS

A riparian forest buffer is a strip of trees, shrubs, and other vegetation along with the undisturbed forest floor next to streams, rivers and lakes. These narrow strips of trees are critical for filtering water running off the land and also provide habitat for wildlife.

A streamside forest slows floodwaters. They also improve water quality by filtering runoff and promoting sediment deposition. These areas store water in plant roots and provide pathways to underground water storage. A riparian buffer will filter out most nitrogen and phosphorus, which increase algae growth.

Streamside forests provide habitat for a variety of birds and small mammals. These buffers also act as travel corridors between larger habitat areas and provide food, shelter and nesting sites. Riparian buffers also provide for recreational activities such as fishing, hiking, and bird watching.

Suggested Project Learning Tree Activity:

#44 - Water Wonders

Part B - A classroom experiment is conducted using models of a vegetated and exposed slope. Identical rectangular containers are elevated the same degree on one end and fitted with drainage spouts on the other. Both are made watertight with plastic wrap. One is filled with a piece of sod, the other with plain soil from the same site. The students make predictions and then sprinkle water (at the same rate) on both containers. The forest's role in watersheds should be discussed.

Suggested Project WILD Aquatic Activities:

Riparian Retreat

After visiting a riparian zone or reading the simulated field trip in the lesson plan, students use art materials to capture the biological diversity of the area and brainstorm ways to lessen the impact of their own visit.

Wetland Metaphors

A modified version of this activity, where the benefits associated with both wetlands and riparian buffers are included, can be developed. Common household items are used as metaphors for filtering capacity, flood prevention, wildlife habitat, and other functions of these areas. Students draw the items from a bag and try to guess which function is represented.

Suggested Project WET Activities:

Rainy-Day Hike

Students construct maps of their school grounds and make predictions of where runoff will occur. On a rainy day, they go out to observe how accurate their predictions were and make comparisons of vegetated and non-vegetated slopes (if possible.) Maps of the entire community are used to identify local watershed(s).

Color Me a Watershed

Using grid maps of a particular watershed 100 years ago, 50 years ago, and present day and the basic data provided in the lesson, students assign colors to the various land uses, color the maps, and calculate the total runoff for each of the time periods. Relationships between land use, runoff volume, and water quality, are discussed.

(See Special Use Forest and Water Quality sections for further activities)

Virginia Standards of Learning Correlations:

Science

6.1, 6.2, 6.9, 6.11, LS.1, LS.4, LS.7, LS.10, LS.11, LS.12, LS.14, ES.7, ES.9, BIO.1, BIO.9

Mathematics

6.1, 6.7, 7.1, 7.7, 8.1, 8.4

History and Social Science

WG.2a,b&C, WG.11a.b&c

Additional Activity Ideas:

- **WOW! The Wonders of Wetlands**, an educator's guide published by The Watercourse, one of the sponsoring organizations of **Project WET**, has several lesson plans that can be adapted to fit the subject of riparian buffers. For example, *This Plant Key Is All Wet! Wetland Wheel,* and *Tracking Plants and Keeping Track* can be used to learn various classification systems for trees and plants that grow in riparian zones. Contact www.montana.edu/wwwwater for ordering information.

Student Assessment:

In small groups, students can select a major watershed such as the Chesapeake Bay or Mississippi River, and give a brief oral presentation on water quality issues affecting that region, with an emphasis on land use.

Key Concepts:

1. The forest products industry is of great economic significance in Virginia. It ranks first in manufacturing jobs and second in salaries and wages in the state.
2. Lumber, wood furniture, and paper are commonly known tree products but a large assortment of less known products are made from wood, fiber, bark, and sap.
3. High quality wood (from mature trees) is used for furniture and for construction in areas where it will be visible, such as moldings, and window and door frames. Younger trees are typically harvested for pulpwood and processed into paper or chipboard.

Related Topics

- Like many other professions, the wood products manufacturing field offers a variety of specialties including engineering, marketing, accounting, and public relations. Strong interpersonal, business, manufacturing, and citizenship skills are all needed.
- **Renewable resources,** such as trees used for paper, can be replenished through natural processes. **Nonrenewable resources**, like graphite for pencils or aluminum for cans, are limited and cannot be replaced during this geologic age.
- By reducing waste and recycling materials, individuals and societies can extend the value and utility of resources and can promote environmental quality.

Debarker VR

Headsaw VR

Endsaw VR

Saw Mill Video

FOREST PRODUCTS

The forest products industry ranks first in manufacturing jobs and second in salaries and wages in Virginia. Timber market values rank second behind poultry and eggs when compared to all of Virginia agricultural crops.

When logs are brought to a sawmill they are sorted by size and species of trees, then stacked in the log yard. Then when they are needed the bark is removed and they proceed through the head saw.

The head saw cuts the log lengthwise into long rectangular pieces called “cants”. The “slabs” which are sawn off the edges of the logs are chipped and sold to paper mills to make paper. The bark is sold for mulch to put around shrubbery.

The log which has been cut into a long rectangular piece called a “cant” will be re-sawn into boards using a gang saw. The boards move down a conveyor and are sorted by species, grade, width, and length. The boards are seasoned or dried so they will stay straight and not warp. The boards will be sold to retail lumber stores, furniture plants, and other places where wood will be manufactured into a variety of products.

Many different products are made from the wood which is harvested in Virginia. When timber is harvested there are usually large straight logs which can be made into lumber for framing houses, and small or crooked logs which can be used for pallets, flooring, paper, and other products.

Some small crooked logs are chipped into pieces and then glued back together to make various products including chipboard, which is used under floors, roofs, and sides when houses are built. Some chemicals in wood are used to make plastics and even used in food products.

Suggested Project Learning Tree Activity:

#2 – Source Reduction (Municipal Solid Waste Module)

Part A - A small groups of students select 2-3 items from an assortment of products that range from having no to excessive packaging. Students complete a "packaging profile" for each of their items, noting among other things whether the packaging is made from recycled materials, whether it can be recycled and whether toxic materials are present. A discussion on ways to reduce the amount of product waste sent to landfills and incinerators follows and then the student groups review which of their original items they would purchase if they wanted to reduce or prevent waste, as well as any substitutions that could be made. Part B - The class discusses what makes a product toxic and what types of items are hazardous. Teams of students analyze common household products with hazardous substances and try to find less toxic alternatives.

Part C - Students create a list of factors used to determine the environmental impact of a product when looking at its total life span (manufacturing, use, and disposal.) Using the list, they complete a "life-cycle analysis" for a pencil and then an item of their choice, such a favorite piece of sports equipment, CD, or hobby item.

Suggested Project WILD Activities:

What Did Your Lunch Cost Wildlife?

Students select a food item from their lunch and trace it back to its origins, using a flow diagram to illustrate all the raw materials and energy that went into its production, processing, packaging, and transportation. Possible negative impacts on the environment and wildlife in particular are noted.

Plastic Jellyfish

Students collect and save every piece of plastic waste produced in their homes in a two-day period, clean them, and bring them to school. The items are then categorized whether or not they can be recycled or re-used, the likelihood of them entering the aquatic food chain, or causing an animal to become entangled. The class surveys the school grounds for other types of litter, discusses the potential impact on the surrounding community, and disposes of it.

(See Middle Aged Pine, Old Pine, Middle Aged Hardwood, and Old Hardwood sections for further activities.)

Virginia Standards of Learning Correlations:

Science

6.3, 6.7, 6.9, 6.11, LS.7, LS.10, LS.12, ES.7, ES.12, BIO.9

History and Social Science

CE.9a, CE.12 a,c,&d, WG.2a,b,&c, WG.5, WG.12, GOVT.11d GOVT.16

Additional Activity Ideas:

- Information on wood properties and uses, and an extensive list of activity suggestions can be found in **A Guide for 4-H Wood Science Projects**, www.forestry.uga.edu.
- **Forests Forever**, a CD-ROM and Teacher's Guide, available from Virginia Forestry Association includes information and activity suggestions on forest products.
- **Pollution Solutions** is a series of K-12 lesson plans on litter prevention and recycling. For more information contact the Project Learning Tree State Coordinator 804-328-3031 www.dof.state.va.us.

Student Assessment:

Have students bring in or describe a favorite item made from wood (i.e. baseball bat, jewelry box). Discuss its possible origin including the type of wood, age, type of forest it may have been harvested from, energy used in manufacturing it, and any possible environmental impacts.

Key Concepts:

1. Fire has been part of the Earth's natural cycle for millions of years. Disturbances from lightning fires and volcanic activity affected plant evolution and natural selection.
2. Some types of forests and other ecosystems (i.e. grasslands, deserts) depend on fire as part of their life cycle. Certain species of conifers produce closed cones and rely on heat from fire to open the cones and release seeds.
3. Low intensity fires result in an increase in plant growth that provides habitat for ground nesting birds and several of Virginia's declining species.
4. Management practices, including prescribed burns, can enhance and extend the usefulness of the forest when appropriately applied.

Related Topics:

- Fire requires a heat source for ignition, and fuel and oxygen to burn. Since fire removes debris (fuel), recently burned forests are less likely to burn again soon.
- The earliest use of fire by humans dates back 1.5 million years. Early people used it for warmth, light and frightening away predators. Native Americans used fire to herd game, create habitat for game species, and clear the land for farming, a practice adopted by the colonists.

Good Fire Video

Bad Fire Video

Wildlife Video

FIRE (Good & Bad)

Low intensity fires are important in some forest types to maintain a healthy ecosystem. Fire clears the forest of woody debris providing room for new plants to grow.

Some plants are dependent on occasional fires to be able to reproduce. Fires result in a flush of new growth which provides food and habitat for many birds and animals. Fire is an important component of the forest ecosystem. Fire also is important in the release of nutrients from woody material. Phosphorus, potash, and other essential nutrients are found in the ash left from fire and are nature's way of fertilizing the new plant growth.

Wildfire or forest fires, which occur during hot, dry, windy periods, can be very destructive of forests, wildlife habitats, and houses. The term "wildfire" usually brings to mind television pictures of homes being threatened by a raging fire out of control. In Virginia, 99 percent of wildfires are caused by people. Each year wildfires cost hundreds of thousands of dollars to control and to protect homes. Annually, about 1,000 fires burn 4,000 acres of forest land. In addition, to destroying timber, wildlife habitat, and occasionally houses, hot fires destroy the covering on the forest floor and erosion can occur when rains come.

Since the mid 1960s, populations of quail, rabbit, and at least 18 other species which have the same habitat requirements, have been in decline. Clean farming, more houses, and nest predators such as possums and skunks have all contributed to the problem. Prescribed fire by natural resource managers, to clear cut-over areas for tree planting and remove understory brush in older stands, is providing needed habitat for these species.

Fire is neither all good, nor all bad. Wildfire is a powerful enemy while a prescribed fire in an effective management tool. In the proper place, at the proper time, under the right conditions, and with the direction of a trained and experienced professional, fire can be a great and valuable tool for the landowner and natural resource manager.

Suggested Project Learning Tree Activities:

#81 - Living With Fire

After the students complete a worksheet on the "Fire Triangle" (the three required elements for fire) the teacher uses a candle, jar and lid to demonstrate what happens when each of the elements are limited. With information obtained by their state forestry department, students chart and compare the number of fires and their causes for at least three different years. Students also research the positive and negative effects of fire on the economy and the environment.

#7 - Understanding Fire (Forest Ecology Module)

Students use information from the student page "Fire in the 1980's" to chart and discuss the impact of several major forest fires that occurred around the globe during that decade. In teams, students then devise several different scenarios involving a hypothetical national forest. The scenarios should involve different fire management decisions based on realistic conditions. Various social, political, economical and environmental interests can be represented while students role-play a public hearing.

#90 - The Native Way

The class reads and compares the fictionalized and authentic version of Chief Seattle's famous speech. Reasons for the differences, such as the value system and viewpoints of the interpreters and editors, are discussed. Students then read a quote from Chief Luther Standing Bear of the Lakota (where he describes the relationship his people have with the Earth) and answer a list of questions.

Suggested Project WILD Activity:

Fire Ecologies

The class takes a field trip to a forested area that has not been burned in modern times, one that has recently been burned and if possible an area that burn over 10 years ago. Student teams note similarities and differences in vegetation, evidence of wildlife, and take soil samples for analysis. Their findings are organized and presented to the class.

Virginia Standards of Learning Correlations:

Science

6.9, 6.11, LS.4, LS.5, LS.7, LS.11, LS.12, LS.14, ES.7, BIO.8, BIO.9

History and Social Studies

CE.7c, CE.7d, WHI.2a&b, WHI2b, WG.2a&b, WG.5, WG.7a&b, WG.12a&b, GOVT.5a,b&d, GOVT.9a,b,c &d, GOVT.11d, GOVT.16c

Additional Activity Ideas:

- The suggested lessons from **PLT** and **Project WILD** contain several ideas for enrichment activities including inviting a professional firefighter, forester, or wildlife biologist to visit the class or accompany them on the field trip described in *Fire Ecologies.*
- Students can select a plant or animal from a list of fire dependent species, research the intricacies of the relationship and report their findings to the class.

Student Assessment:

Completing the suggested activities allows numerous opportunities for assessing student understanding through the production of charts and graphics and oral presentations.

Key Concepts:

1. Water quality and quantity in streams and aquifers depend to a large extent on forest cover.
2. Streamside forested buffers provide many benefits including preventing **erosion** and flooding, filtering runoff and providing wildlife habitat.
3. Although their effects may be similar, water pollutants can be categorized as chemical, thermal, organic, and ecological (from a natural occurring process, such as erosion.)
4. Water pollution is considered to be **point source** (easily identifiable as in the case of a discharge pipe or sewer) or **nonpoint source** (difficult to trace and often cumulative in nature.)
5. **Best Management Practices** (BMPs) are land use methods used by natural resource managers designed to prevent or reduce nonpoint pollution.

Related Topics:

- The sequence of organisms through which energy is transferred in an ecosystem is called a **food chain.** Food chains consist of producers (green plants) that make their own food and consumers (herbivores, carnivores, omnivores, and decomposers.)

Streamside Buffer VR

Wildlife Opening VR

Wildlife Video

Logging Video

WATER QUALITY

The arrow identifies a small stream, which is protected from sediment runoff by the trees left uncut within the riparian forest buffer.

Trees improve water quality by reducing runoff and erosion. Forests along streams can remove excess nitrogen, filter sediments and reduce phosphorus that would enter streams. Trees along streams hold the soil in place, slow water flow, and filter the water coming from upland areas.

Streamside forest buffers provide canopy cover, which shades and cools the stream, improving habitat conditions for in-stream organisms such as fish, salamanders, frogs, and aquatic insects that are a key link in the food chain.

Timber harvesting usually includes log roads to allow log trucks to enter the area. Skidders, that drag logs to an area called a "landing" where they are then loaded onto trucks, use skid trails. If the log roads, skid trails, and landings are properly located and constructed then the environment can be protected. Any disturbed soil should be sown to grass after harvest.

Often the log landing is used for a wildlife opening and is planted to grasses and other plants, which provide food and cover for a variety of wildlife.

Scientific research in the Blue Ridge Mountains and other places has proven that cutting trees does not cause soil erosion. Forest management and timber harvesting can be accomplished without harming the soil or water quality. The key is a well-planned project using proven techniques called "best management practices" or BMPs for short.

Suggested Project Learning Tree Activities:

#7 - Watch on Wetlands (Secondary Modules Introductory Handbook)

In Part A, the class is divided into photo, map, plant, animal, and water quality survey teams to collect data during a visit to a wetland. In Part B, Students become familiar with state and federal agencies that have a regulatory role in the development of wetlands. A proposed development in a designated wetland is debated in Part C.

#8 - Take Action! (Focus on Forests Module)

Read how a Future Farmers of America chapter in New Mexico were the predominate force in improving water quality and habitat in a state park, and have students select a local forest related issue to address. Suggested community projects include developing a poster campaign, publishing articles, trail maintenance, litter pick-up, stream monitoring or educating younger students about forests.

Suggested Project WILD Aquatic Activity:

Deadly Waters

After discussing four main types of water pollution, chemical, thermal, organic and ecological, student groups analyze the pollutants found in hypothetical rivers and prepare bar graphs of their results. Different colored pieces of (paper punched) paper represent different substances. Students decide whether the substance is at a toxic level (more than 2 per ¼ teaspoon) and which category of pollution it fits into. Recommendations for corrective actions are discussed.

Suggested Project WET Activity:

Sum of Parts

Students "inherit" a numbered riverfront property picture with blue space representing the river and blank space area (undeveloped). They also "inherit" a million dollars to develop it as they see fit. After adding their developments (if any) to their pictures, they line up in numerical order to represent the flow of the river. Objects from their desks (or from the teacher) that symbolize the different types of non-point water pollution created by their land developments are passed from the upstream people to the downstream until the last students in line are holding everything. Discuss the role of each citizen in the pollution of a river and the list of Best Management Practices (BMPs).

(See Riparian Buffers and Special Use Forest sections for further activities.)

Virginia Standards of Learning Correlations:

Science

6.1, 6.2, 6.7, 6.8, 6.9, 6.11, LS.1, LS.4, LS.6, LS.7, LS.9, LS.10, LS.11, ES.7, ES.9

English

6.2, 6.9, 7.1, 7.2, 7.3, 7.10, 9.2, 9.7, 10.10, 11.1, 12.1

Additional Activity Idea:

- How certain pollutants are passed in the aquatic food chain is presented through an engaging game in the **Project WILD** lesson *Deadly Links.* The pesticide DDT's effect on the bald eagle population is discussed as a part of the lesson. Since Rachel Carson's book **Silent Spring** contributed to the ban on DDT and profoundly shaped the modern environmental movement, numerous opportunities for interdisciplinary lessons exist. Rachel Carson is among the featured writers in #7 *Words to Live By* (**PLT** Focus on Forests Module.)

Student Assessment:

Students use aerial photographs, maps, or pictures they drew themselves or clipped from magazines to review the many benefits of forested riparian areas.

Key Concepts:

1. Trees enhance the economic and aesthetic value of the urban environment.
2. Trees improve air quality by absorbing harmful gases, producing oxygen and trapping dust particles.
3. Other benefits of (even small) forested areas include insulation from temperature extremes, wildlife habitat and corridors, and recreational opportunities.

Related Topics:

- Certain species of fish, aquatic insects, and other macro-invertebrates require cooler water temperature and a relatively high degree of water quality. Forested buffers increase the likelihood of such species being present in adjacent waterways.
- The degree of negative impact on trees at construction sites is a function of the amount of site disruption (i.e. soil movement and compaction) the amount of tree injury, the length of time the construction project takes, and when it occurs in the trees' seasonal growth cycle.

Urban Riparian VR

Street Trees VR

Wildlife Video

URBAN FORESTRY

Trees are always working to help people. Trees can reduce air conditioning needs by 30 percent and tree windbreaks can save 20 to 50 percent in energy used for heating. Trees reduce noise pollution by absorbing unpleasant sounds from the urban environment.

Trees improve air quality by trapping and holding dust particles that can damage human lungs. Tree leaves absorb carbon dioxide and other poisonous gases, and in turn replenish the atmosphere with oxygen for us to breathe. One acre of trees provides oxygen for 18 people. Trees save household energy by cooling during hotter months and serving as a windbreak in the winter. As a result, you burn less fossil fuel for heating and cooling.

The economy of an area is improved by having trees. People shop longer along tree-lined streets and apartments and offices in wooded areas rent more quickly. Trees also add 10 percent or more to a property's value. Trees improve the quality of life and the beauty of our surroundings. Trees help relieve stress associated with living in cities and medical research indicates patients in rooms that have a view of trees get better faster.

These wooded strips provide a local ecosystem and provide habitat for animals and birds that would otherwise be absent from urban areas. Leaves and twigs are the basis of food in the stream ecosystem, being utilized by insects that are in turn prey for fish. This shade also provides habitat for a variety of birds and small mammals. These buffers also act as travel corridors between larger habitat areas and provide food, shelter, and nesting sites. Riparian buffers also provide for recreational activities such as fishing, hiking, and bird watching.

Suggested Project Learning Tree Activities:

#85 - Air To Drive

With help from a parent, students demonstrate the effect of automobile exhaust on air quality using a clean sock or cloth and the tail pipe of their family vehicle. A demonstration of the Greenhouse Effect is set up in the classroom using a mini greenhouse and seedlings. Students calculate the amount of CO_2 their family vehicle produces based on the mileage and amount of gasoline it burns in one week. Given the statistic in the lesson plan (an average young tree removing 25 pounds of CO_2 from the atmosphere per year), students determine how many trees are needed to counteract the effect of their family's automobile. In #73 *Waste Watchers***,** students make additional calculations related to their family's energy consumption (and CO_2 production) by learning how to read an electric meter.

#54 - I'd Like To Visit A Place Where...

After brainstorming a list of urban recreational sites that require open space and trees, students write a description of their favorite area or facility and create a class index file. Options include designing a park or other recreational site in small groups and completing an improvement project at a local park or natural area. Information on how trees are impacted by development and the local municipality's tree policy, if applicable, would be helpful in completing both the design and improvement projects. (Several articles on community forestry can be viewed at www.forestry.uga.edu/warnell/service/library)

#77 - Trees In Trouble

Part A - Using "Tree-tective Trouble Guide" and "Reading Leaf Symptoms" student pages, student teams identify symptoms of unhealthy (diseased and/or injured) trees in the schoolyard or surrounding area. Students hypothesize about what caused the damage and prepare a report.

Suggested Project WILD Activity:

Urban Nature Search

As individuals or in teams, students use a questionnaire designed by the teacher to explore different microhabitats in an urban environment. Special attention can be given to the plant and animal species found in various locations including forested areas. A discussion on how certain species have adapted to living in an urban environment follows. In **PLT** Activity #47 *Are Vacant Lots Vacant?* students conduct a similar investigation.

(See Pine Harvesting and Tree Planting section for further activities)

Virginia Standards of Learning Correlations:

Science

6.1, 6.2, 6.3, 6.9, 6.11, LS.1, LS.4, LS.6, LS.7, LS.10, LS.11, LS.12, LS.14, ES.7, BIO.1, BIO.5, BIO.8, BIO.9

History and Social Science

WHII.8, WG.2a,b,&c, WG.5, WG.7a&b, WG.12a&b, GOVT.16

Mathematics

6.6, 6.7, 6.9, 8.4

Additional Activity Ideas:

- Ideas can be gleaned from **Discovering the Urban Forest**, an activity book for 4^{th}-7^{th} graders produced by the South Carolina Forestry Commission, **Urban Forestry 4-H Project** (Pub#ANR124) Auburn (AL) Extension Service, and **Urban Forest Activity Book** available from the Mississippi Association of Conservation Districts.
- Students can research and give brief oral reports on how highly adaptable wildlife species such as coyote, fox, gray squirrel, birds, and insects co-exist with humans in urban environments.

Student Assessment:

Using *I'd Like to Visit A Place Where…* or another type of model, have students discuss the benefits trees provide in the urban environment and the potential hazards trees face in rapidly developing areas.

VIRGINIA'S FOREST RESOURCES

Virginia's forests are a renewable natural resource that provides each of us numerous environmental, economic, and cultural benefits that improve our quality of life. Our forest resources mean so many things to so many people - they truly are our "Common Wealth".

Forests moderate our climate, provide clean water, fresh air, homes for wildlife, scenic beauty, and recreational opportunities. Forests provide thousands of wood products, jobs, and quiet places for observing nature, and spiritual renewal.

Forests are ever-changing. Sometimes the changes are swift as a result of fire, ice, wind, or timber harvest. Sometimes these changes are centipede slow over many seasons. A forest is more than trees. A forest is an ecological system made up of all the organisms that inhabit it - trees to mosses, birds to bacteria. All are inter-dependent; and it is the myriad of interactions among the living components of the forest and the physical environment that keep a forest productive and self-sustaining for many years.

Hardwood forests cover over 70% of the total forest area of Virginia. Nearly all of the natural forests in Virginia have been extensively modified by human activities during the past 300 years. Very few areas have escaped being harvested. Most of the Piedmont and Coastal plains were cleared for agricultural use in Colonial times. The mountains were cut-over for charcoal, lumber, and salvage of victims of the chestnut blight through the early 1900s. Many sites have been harvested or cleared several times for farms or pasture, then later abandoned, to be reforested over several generations.

Pines are mostly pioneer species - the first trees to seed in on bare ground after a fire, or on abandoned fields. Like most oak trees, pine seedlings need full sunlight to grow - they cannot tolerate shade. Extensive research and development has dramatically increased the growth potential and range of loblolly pine. Each year over 60 million pine seedlings are planted to reforest cut-over or abandoned land in Virginia.

Monitoring Forest Health

Having a diversity of forest types and ages keeps the forest healthy, helps reduce insect and disease problems, and benefits a variety of wildlife. Forests can be kept healthy and growing through proper management. Occasionally this includes harvesting older trees or

forests to make room for younger healthier ones. When forests are mature and are harvested the primary consideration should be creating conditions favorable for the development of a healthy new stand of trees.

Of the 16 million acres of forestland in Virginia, nearly 75% is owned by non-industrial private forest landowners. State and federal governments own 12% and forest industries own 13%. It is

estimated that there are over 300,000 individual private landowners. Surveys predict that one-third of the private forestland will change ownership every 13 years.

Protecting Water Quality

Forests are critical to maintaining water quality. Acting as a living filter, forests capture rainfall, regulate storm-water and stream flow, filter nutrients and sediments, and prevent erosion. When streams are buffered by surrounding forests, runoff washing into streams is greatly reduced.

Healthy forested riparian areas provide critical habitat for numerous animals and plant communities. Shading streams and moderating water temperatures is critical for many fish and aquatic organisms. Riparian areas are used for travel corridors and help protect endangered species and critical habitats for food, shelter and nesting. Riparian buffers enhance aesthetics, slow the spread of wildfires, and provide recreational activities such as fishing, hiking, and bird watching.

Good Fire and Bad Fire

In Virginia, 99 percent of wildfires are caused by people. Each year wildfires cost hundreds of thousands of dollars to control and to protect homes. Annually, about 1000 fires burn 4,000 acres of forest land. In addition to destroying timber, wildlife habitat, and occasionally houses, hot fires destroy the covering on the forest floor and erosion can occur when rains come. Fire, however, is an important component of the forest ecosystem. Foresters and wildlife managers often use *controlled or prescribed fire* to actually improve tree planting sites and enhance wildlife habitat conditions. Fire is neither all good, nor all bad, it is powerful. In the proper place and time, with the right conditions, and under the direction of trained and experienced professionals, fire can be a valuable tool for the landowner and resource manager.

Preserving Biological Diversity

Virginia has been called an “ecological crossroads” for its vast range of distinctive natural communities, physiographic regions, and natural features. Here, southern and northern ecosystems are found in close proximity. Within our borders are found lush cove forests and desert-like barrens of our western hills, expansive caves and springs of the Shenandoah Valley, plunging streams and boreal forests of the Blue Ridge Mountains. In the East are found pristine freshwater tidal marshes along our unique Chesapeake Bay, and the coastal plain’s distinctive pocosins, cypress swamps, and barrier islands. From the Cumberland Plateau to the Eastern Shore, there are a tremendous diversity of natural communities supporting an impressive array of plant and animal species, some of which occur nowhere else on earth.

CONSERVING THE FOREST LAND BASE

One of the greatest threats to our forests is not wildfires, insects or diseases, but the conversion of forestlands to other uses. Recent surveys show that Virginia loses over 20,000 acres of forestland each year. This is not from the harvesting of trees for forest products such as lumber, paper, or firewood – but rather the conversion of forestland to house sites, shopping centers, roads and other development purposes. Rapid population growth places an ever-greater demand on our shrinking forest land base. Fragmentation of large parcels of land occurs when large parcels are broken into smaller blocks for houses, roads and other non-forest uses. Fragmentation is increasing and it limits the options for resource management and forest products because of the reduced size of operable units. It threatens wildlife species that need sizable habitat free of constant disturbance and human competition. Fragmentation also threatens the vitality of Virginia's natural landscape, which delights residents and attracts millions of tourists to revel in its beauty. Responsible, sustainable, forest management and forest land base conservation measures need to be encouraged with increased efforts towards land use planning based on scientific resource assessment data and research.

The Future of Virginia's Forests Depends on You!

Whether you own forest land or not, you use forest products, enjoy outdoor activities, depend on clean water, fresh air, view wildlife, seek solitude and spiritual renewal, all adding to our quality of life.

Be informed, recycle, conserve resources, support organizations that work for the conservation and sustainability of forestlands and related resources, encourage sustainable management, promote land use planning and adoption of conservation easements to protect rural lands.

We protect what we enjoy.

We enjoy what we understand.

We understand what we are taught

Teach someone about the value of our forests and enjoy nature.

WEB SITE

www.dof.state.va.us

Your source for information on the Protection, Management, and Conservation of Forest Resources

The WEB SITE includes:

CONTACTS

County Offices and Information Links
Central Office and Regional Offices
VDOF Personnel
State Forests

CONSERVATION EDUCATION

Events
Kids Pages
Holiday Lake Forestry Camp
Virtual Tour of the Forest

FOREST PROTECTION

Forest Fire Laws
Home Fire Safety
Fire Programs
Fire Danger Rating, Fire Weather
Insects and Disease
Wildfire Situational Reports

RESOURCE INFORMATION

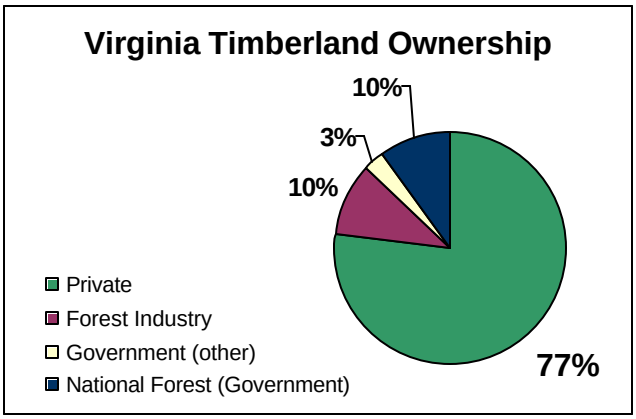
Forestry Facts and Figures
Forest Inventory and Analysis
Geographic Information System
Forest Resource Assessment

FORST MANAGEMENT

Landowner Assistance
Riparian Buffers
Tree ID and Seedlings
Selling Timber and Taxes
Water Quality and Wildlife

URBAN AND COMMUNITY FORESTRY

FORESTRY LINKS



FOREST FACTS AND FIGURES

The value of Virginia's forests is many things to many people. To some, the value lies in the beauty of the forests. Landowners and the forest products industry consider the utilization of the resource as the most valuable asset. Whatever the "value," we must recognize that Virginia's forests provide a renewable natural resource that extends from harvesting timber to natural beauty. Whether it's a walk in the urban forest or a hunter in rural woodland, all Virginians can enjoy this resource as it continues to provide a necessary framework for our daily lives. The importance of forests in cleansing the air, purifying our water, providing products, and fostering recreation opportunities must be embraced as we advance into the 21st century. Our Virginia standard of living depends on the abundance and stability of the forest resource. Virginia's forests are our "*common wealth,*" providing both environmental and economic benefits as follows:

- 15.4 million acres of forestland capable of providing commercial forest products covers 61 percent of Virginia's landscape.
- Landowners earned $345 million in stumpage for their timber in 1999.
- Timber harvesting contributes $863 million annually to the economy.
- The market value of the timber harvested had a 1999 value of $863 million at first point of delivery.
- Minor forest products contribute over $60 million to Virginia's economy.
- 79,000 acres of parks, wilderness, scenic and historic areas provide recreational activities to millions of Virginians and visitors alike.
- The combined wildlife and forest recreational values contribute more than $3 billion annually to Virginia's economy.

Virginia's forest still cover two-thirds of the state an extraordinary figure considering the overwhelming population growth in some areas. Virginia's forests have five major timber types.

- Hardwood types equal 78 percent of the total acres
- Pine types equal the remaining 22 percent.
- Pine plantations comprise 44 percent of the pine acreage
- Loblolly pine is the principal planted tree
- Yellow Poplar is the most abundant of the hardwood species

The majority of Virginia's 16 million acres of forestland is privately owned. More than 400,000 private forest landowners own 77 percent of the commercially productive timberland. Forest industry owns 10 percent and the remaining 13 percent is owned by federal, state and local government.

Nearly every county in Virginia has wood-using industry. In 1940, Virginia's timber resource could only build two million homes. Today, we have enough for six million homes. More significant is the fact that during the last 50 year period, enough timber has been harvested to have built six million homes.

The forest industry contributes significantly to Virginia's economy. Growth in secondary manufacturing of forest products often referred to as "value added" continues to occur enhancing overall competitiveness. Processing timber into usable products involves harvesting, and primary and secondary manufacturing. Every $1 received by landowners generates $35.40 total value added into Virginia's economy. The forest resource of the Commonwealth contributes annually $30.5 billion to Virginia's economy and more than 248,000 wage earners. In 1999, harvested timber had a market value of $863 million when transported to the first point of delivery. Timber ranked first when compared to market values of Virginia agricultural crops.

Forest landowners receive many economic benefits of forest land ownership, which, in turn, contribute to Virginia's economy. Income is derived from timber sales, hunting, fishing, and recreational leases. The Virginia Department of Forestry, private industry, and consultants assist these non-industrial private landowners in forest resource management and reforestation to maintain healthy, sustainable forests.

Virginia's forest products are a key component of a continued strong economy providing income and jobs. To maintain a sustainable forest resource, a favorable business environment free of cumbersome regulations, cooperative efforts and programs with forest industry, landowners, government agencies and conservation associations are imperative.

CONTACTS FOR CONSERVATION EDUCATION MATERIALS

Virginia Department of Forestry
900 Natural Resources Drive-Suite #800
Charlottesville, VA 22903
Office (434) 977-6555
V/TDD (434) 977-6555
Fax (434) 296-2369
www.dof.state.va.us

Virginia Tech
College of Natural Resources
324 Cheatham
Blacksburg, VA 24061
(540) 231-7670
www.fw.vt.edu

Virginia Forestry Association
8810 B Patterson Avenue
Richmond, VA 23229-6322
98040 741-0836
vafa@erols.com

Virginia Department of Game and Inland Fisheries
P.O. Box 11104
Richmond, VA 23230
(804) 367-1000
www.dgif.state.va.us

Virginia Department of Environmental Quality
Office of Environmental Education
P.O. Box 10009
Richmond, VA 23240-0009
(804) 698-4000
www.deq.state.va.us

Virginia Resource-Use Education Council
Virginia Department of Environmental Quality
Office of Environmental Education

USDA Forest Service
Natural Resources and Conservation Education Program
P.O. Box 96090
Washington, DC 20090-6090

ADDITIONAL RESOURCES

Guide to Southern Trees by Elwood S. Harrar, School of Forestry, Duke University and George Harrar, President, Rockefeller Foundation, 2nd Edition, Dover Publications, Inc., New York.

Textbook of Dendrology by William M. Harlow, Ph.D., State University of New York, College of Forestry, McGraw-Hill Book Company Inc., New York.

Trees of North America by C. Frank Brockman, College of Forest Resources, University of Washington, Golden Press, New York.

Woody Plants in North America (CD-ROM) by Edward C. Jensen, John A. Peterson, and John R. Seiler. Kendall/Hunt Publishing.

The American Forest Resource Council
1500 SW First Avenue, Suite 330
Portland, Oregon, 97201
Tel: (503) 222-9505

American Forestry Association
Global Teacher's Releaf Guide
1516 P Street NW
Washington DC 20005
(800) 368-5748

Virginia's Natural Resource Education Guide
www.vanaturally.com/eduguide.htm

Virginia Tech College of Natural Resources
Dendrology website
www.fw.vt.edu/dendro/dendrology/dendro/htm

Virginia Cooperative Extension 4-H
www.va4-h.org

WoodLinks - An Industry Education Partnership
www.woodlinks.com

PRE-POST STUDENT ASSESSMENT

1) _____ is the orderly and progressive replacement of plant and animal species through time in a given location.
    a. Replanting
    b. Succession
    c. Landscaping
    d. Select harvest

2) The dominant species in the forest community _____.
    a. is the most numerous
    b. has the largest biomass
    c. occupies the most space
    d. all of the above

3) The forest products industry ranks _____ in creating manufacturing jobs in Virginia.
    a. first
    b. second
    c. middle
    d. last

4) If a landowner wants to regenerate trees requiring full sun, but does not want to clearcut, s/he can _____.
    a. wait until the trees die, and replant them
    b. install grow lights
    c. conduct a deferment cut
    d. none of the above

5) Forest buffers are _____.
    a. fences that conceal the forest.
    b. narrow borders of trees preserved along streams and roads
    c. large cleared areas along the edges of the forest
    d. a and b

6) In Virginia, 99% of wildfires are caused by _____.
    a. lightening
    b. the sun
    c. volcanoes
    d. people

7) Forests _____.
    a. provide clean water and fresh air
    b. provide thousands of wood products
    c. moderate our climate
    d. all of the above

8) What is one management tool foresters use to keep a forest healthy?
    a. fire
    b. fertilizer
    c. irrigation systems
    d. none of the above

9) Forests are a _____.
    a. non-renewable resource
    b. renewable resource
    c. both a and b
    d. neither a or b

10) Managed forests provide homes for _____.
    a. bobwhite quail
    b. wild turkey
    c. cottontail rabbits
    d. all of the above

11) The most important part of a forester's job is to _____.
    a. keep people out of the forest
    b. maintain a healthy forest environment while providing wood for human needs
    c. look for gypsy moths
    d. all of the above

ANSWERS - PRE-POST STUDENT ASSESSMENT

1) Succession is the orderly and progressive replacement of plant and animal species through time in a given location.

2) The dominant species in the forest community is the most numerous, has the largest biomass, and occupies the most space.

3) The forest products industry ranks first in creating manufacturing jobs in Virginia.

4) If a landowner wants to regenerate trees requiring full sun, but does not want to clearcut, s/he can conduct a deferment cut.

5) Forest buffers are narrow borders of trees preserved along streams and roads.

6) In Virginia, 99% of wildfires are caused by people.

7) Forests provide clean water and fresh air, provide thousands of wood products, and moderate our climate.

8) What is one management tool foresters use to keep a forest healthy? Fire

9) Forests are a renewable resource.

10) Managed forests provide homes for bobwhite quail, wild turkey, and cottontail rabbits.

11) The most important part of a forester's job is to maintain a healthy forest environment while providing wood for human needs.

TREE LIFECYCLE

Adapted from Project Learning Tree ã 1993

Overview

In this activity, students will discover that trees have a lifecycle that is similar to that of other living things. They will investigate a tree's role in the ecosystem at each stage of its life.

Background

One of the best ways to learn about trees is to look at their life history. Trees, like all living things, have a lifecycle that includes birth, growth, injury and disease, aging, and death. As trees go from birth to death, their physical form changes, as well as their role in the forest ecosystem. You can learn about past changes in environmental conditions by looking at the growth rings in a cross section of a tree. Even more can be learned about the tree's lifecycle by observing the tree from birth as it grows and develops throughout its life.

Most trees begin as seeds. Generally, trees are put into flowering and non-flowering categories. The angiosperms are flowering plants, including wildflowers, shrubs, and many trees. Angiosperms are pollinated by insects, bats, birds, and the wind. Plants that have flowers also protect their seeds inside a fruit. Maple, oak, and all other broad-leaved trees are angiosperms. Gymnosperms (from Latin "gymno-", meaning "naked") have seeds that are not enclosed in fruit or flowers. Rather, most gymnosperms produce their seeds in cones and are pollinated by the wind. The most common type of gymnosperms are the cone-bearers, or conifers, like redwoods, firs, pines, and other trees with needle-like leaves.

If a seed lands in an area with favorable soil, climate, and nutrient conditions, it will germinate (some remain dormant for long periods before sprouting). Usually, many more seeds will be produced than can possibly survive. Most seeds will be destroyed by fungi or other decomposers, or eaten by birds or mammals, leaving only a few sprouts to survive and become mature members of the forest community.

As part of the understory, young saplings must compete with other trees and plants for sunlight, nutrients, water, and space. In dense forests, many young trees must wait for years for older trees to fall and leave openings in the canopy for them to grow into. The length of time it takes a tree to reach maturity depends on the species of tree.

Trees have many different roles in the forest community depending on their age and size. Their leaves, bark, seeds, flowers, fruit, and roots provide food for many kinds of animals. Trees also provide roosts, shade, and shelter to many living things. For example, holes in older trees and around their roots provide shelters for nests and dens.

Like all living things, trees are subject to disease and injury. Physical damage may not kill the tree, but may provide holes and openings in which animals and insects can live and feed. Eventually, trees weakened by injury and disease will die, fall down, and be decomposed. When they die, trees return their nutrients and other elements back into the soil to be recycled through the forest ecosystem.

Level:

Grade 3 - 6

Virginia Standards of Learning Correlations:

Science 4.5, 6.9

English 4.1, 5.1

Concepts:

- Organisms change throughout their lifetimes. Species of organisms change over long periods of time.
- While every organism goes through a lifecycle of growth, maturity, decline, and death, its role in the ecosystem also changes.
- Ecosystems change over time through patterns of growth and succession. They are also affected by other phenomena such as disease, insects, fire, weather, and human intervention.

Skills:

- Ordering and arranging
- Representing
- Identifying relationships and patterns

Objectives:

Students will:

1. diagram the lifecycle of a tree.
2. compare a tree lifecycle to a human lifecycle
3. explain the role each stage of a tree's life plays in the forest or other ecosystem.

Materials:

Art materials

Copy of student worksheet

Time Considerations:

Preparation: 15 minutes

Activity: 50 minutes

Getting Ready

Select a few books on trees from the school library including field guides and stories. Start a "Tree-Source" center, so that the students have easy access to materials for researching trees. Make a copy of the Tree Lifecycle Worksheet for each student.

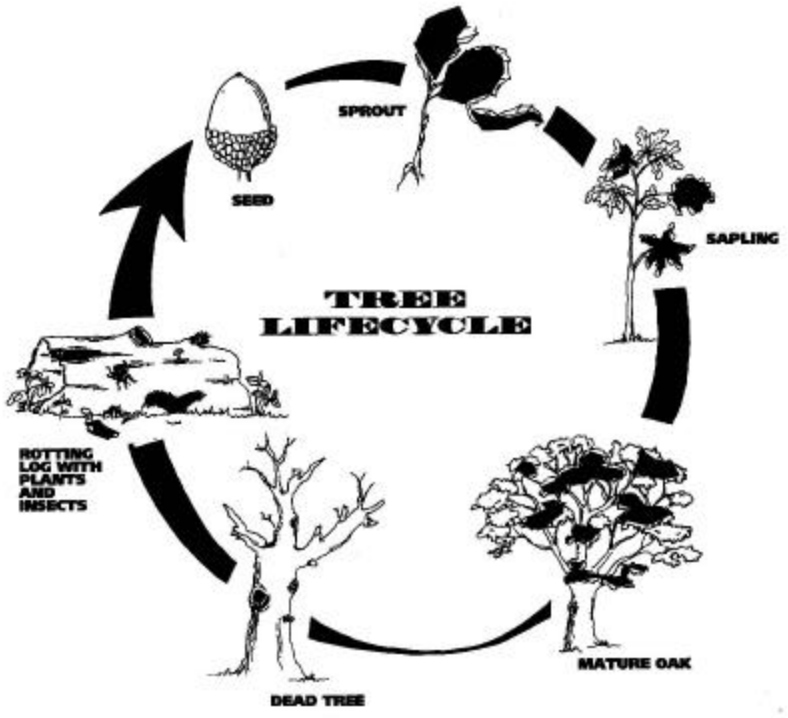
Doing the Activity

1. Discuss the idea of lifecycles by asking the students to describe the lifecycle, or history of a person. Make sure students include childhood, teenage years, young adulthood, and so forth, in the discussion. Write these stages on the chalkboard. Ask students to identify the different jobs, roles, or things that a person might do in each stage of the lifecycle. Next, ask them to describe the lifecycle of a tree in similar terms (see diagram).
2. Distribute art materials and ask students to create the lifecycle of a tree, from birth through death and decomposition. Students should include at least three stages or events in their lifecycles (e.g., a forest fire or insect invasion). Encourage them to research a particular species of tree for accuracy in life characteristics, climate, and environment. Remind students that one event that affects the tree (e.g., insect damage) is likely to clear the way for another event (e.g., a hole for nesting birds). The lifecycle could be represented by a circle on the page, with illustrations and a label for each stage or event or could be shown in a line on a long narrow piece of paper taped together at the ends.
3. Students should fill in the details for at least three stages or events on the "Tree Lifecycle" worksheet. Some items may stay the same throughout the tree's life.
4. Give students the opportunity to share their lifecycles in small groups or with the entire group. Create a "History of the Forest" exhibit by mounting all the lifecycles around the classroom.

Enrichment

Take students on a walk through a neighborhood, local park, or forest site that has plants and trees of various ages. Ask the students to look for trees at various stages in their lives. Have them try to identify at least one tree in each of the following categories:

- Young sapling (stem or trunk < ½ inch)
- "Juvenile" (stem or trunk ½ inch to 2 inches)
- "Young adult" (stem or trunk > 2 inches, but tree still under canopy)
- "Adult" (trunk > 2 inches, tree in upper canopy)
- Injured or unhealthy trees (showing signs of injury, disease or stress--Is the tree likely to survive?)
- Elderly tree (What factors are weakening the tree?)
- Dead tree (What factors combined to cause death?)



Assessment

Have students write an imaginative story about the lifecycle of the particular tree they created. In the story, students should include at least three stages or events of the trees life, such as sprouting form a seed or dying and decomposing into the soil. Ideally, the life events should show a cause-effect connection (e.g., a drought one year might lead to a fire that enables the cones of a particular tree to sprout).

Tree Lifecycle Worksheet

Fill in the information for various stages or events in your tree's lifecycle. Describe at least three stages or events.

Type of Tree:

Scientific Name:

Characteristics of Tree:

Lifecycle stage or event: **Tree age:** **Role in forest ecosystem:** **List of things tree depends on to survive:** **List of things that depend on the tree to survive:** **Processes that might move tree into the next stage**	**Lifecycle stage or event:** **Tree age:** **Role in forest ecosystem:** **List of things tree depends on to survive:** **List of things that depend on the tree to survive:** **Processes that might move tree into the next stage**
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GLOSSARY

BEST MANAGEMENT PRACTICES (BMPs) - Implies a practice or combination of practices, that is determined by a state or designated area-wide planning agency to be the most effective means of preventing or reducing the amount of pollution.

BROWSE - Portions of woody plants including twigs, shoots, and leaves used as food by such animals as deer.

CANOPY - The upper level of a forest, consisting of branches and leaves of taller trees.

CARRYING CAPACITY - The maximum number of animals possible in an area without inducing damage to vegetation or related resources.

COMMUNITY - A collection of living organisms functioning together in an organized system through which energy, nutrients, and water cycle.

CONSERVATION - The protection, improvement, and use of natural resources according to principles that will assure their highest economic and social service. **CONTROLLED BURNING -** The planned application of fire with intent to confine it to a predetermined area.

DECIDUOUS TREE - A tree which loses all of its leaves during the winter season.

DIVERSITY - The variety of plants and animals on an area.

DOMINANT - The tallest, fastest growing trees in a plantation or natural stand.

DOMINANT TREES - Those trees within a forest stand which extend their crowns above surrounding trees and capture sunlight from above and around the crown.

ECOLOGY - The study of interactions between living organisms and their environment.

ECOSYSTEM - An interacting system of living organisms (plants and/or animals), soil and climatic factors. Foresters consider a forest an ecosystem.

ECOTONE - A transition between two distinct communities.

EDGE - The boundary between open land and woodland or two other ecological communities. This transaction area between environments provides valuable wildlife habitat. Consideration of edge can reduce visual impact of a timber harvest.

EDGE EFFECT - The increased richness of plants and animals resulting from the mixing of two communities where they join.

ENDANGERED SPECIES - A species designated as being in danger of becoming extinct.

ENVIRONMENT - The prevailing conditions which reflect the combined influence of climate, soil, topography and biology (other plants and animals) factors present in an area.

EVEN-AGED FOREST - A forest in which all of the trees present are essentially the same age (within 10 to 20 years).

EVERGREEN - Trees which retain green foliage throughout the year. Not all conifers are evergreens. An example is tamarack.

FOOD CHAIN - A group of plants, animals, and/or microorganisms linked together as sources and consumers of food.

FOREST - A plant community in which the dominant vegetation is trees and other woody plants.

FOREST MANAGEMENT - Giving the forest the proper care so that it remains healthy and vigorous and provides the products and amenities the landowner desires.

FORESTRY - The scientific management of forests for the continuous production of goods and services.

GROUND WATER - The subsurface water supply in the saturated zone below the level of the water table.

GROUP SELECTION - A process of harvesting patches of selected trees to create openings in the forest canopy and to encourage reproduction of uneven-aged stands.

HABITAT - The local environment in which a plant or animal lives.

HARD MAST - Fruits of oaks, hickories, pines, and beech trees that are important foods of many species of wildlife in the fall and winter.

HARDWOOD - A term used to describe broadleaf, usually deciduous, trees such as oaks, maples, ashes, elms, etc. It does not necessarily refer to the hardness of the wood.

HARVEST - A general term for the removal of trees.

HERBACEOUS VEGETATION - The low-growing, non-woody plants in a forest understory, including wildflowers and ferns.

HIGH-GRADING - Removing the mature, high quality trees from a stand and leaving inferior species and defective trees. "Take the best and leave the rest."

HOME RANGE - The area which an animal uses during its normal activities, not to be confused with territory.

MAST - Nutlike fruits of trees, such as acorns, beech, and chestnuts. Mast is valuable as a source of food for many wildlife species.

NATURAL REGENERATION - Regenerating a stand of trees using seed from trees either on-site or nearby, or sprout growth for some species of hardwoods.

NONPOINT SOURCE POLLUTION - Pollution arising from all ill-defined and diffuse source, such as runoff from cultivated fields, grazing land, or urban areas.

OVERSTORY - The canopy in a stand of trees. In contrast to the understory which is low growing woody or herbaceous vegetation forming a layer beneath the overstory.

POINT SOURCE POLLUTION - Pollution arising from a well-defined origin, such as a discharge from an industrial plant.

PRESCRIBED BURNING - Skillful application of fire to natural fuels that will allow confinement of the fire to a predetermined area and at the same time will produce certain planned benefits.

PULPWOOD - Wood cut or prepared primarily for manufacture into wood pulp, for subsequent manufacture into paper, fiber board, or other products.

SELECTION CUT - A regeneration cut designed to create and perpetuate an uneven-aged stand. Trees may be removed singly or in small groups. A well designed selection cut removes trees of lesser quality and trees in all diameter classes along with merchantable and mature high quality sawlog trees.

SHADE TOLERANCE - Relative ability of a tree species to reproduce and grow under shade.

SHELTERWOOD HARVEST CUTTING - A harvest cutting in which trees on the harvest area are removed in a series of two or more cuttings to allow the establishment and early growth of new seedlings under partial shade and protection of older trees. Produces an even-aged forest.

SNAG - A standing dead tree used by many species of birds and mammals for feeding and nesting.

SOFT MAST - Soft fleshy fruits eaten by wildlife (examples: persimmon, wild grapes, blackberries, blueberries, huckleberries, mulberries, plums, and crabapples).

STAND - A group of trees occupying a given area and sufficiently uniform in species composition, age and condition so as to be distinguishable from the forest on adjoining areas.

STREAMSIDE MANAGEMENT ZONE (SMZ) - An area of natural timber or vegetation protected and maintained on each side of a stream or drainage to provide habitat diversity, wildlife travel corridors and protect water quality.

SUCCESSION - The progression of vegetation types after site disturbance which begins with herbaceous plants and ultimately reaches a mature forest. The gradual replacement of one plant community by another.

THINNING - Removal of trees in an overstocked stand to give the remaining trees adequate room for growth.

TREE - A woody plant having a well-defined stem, more or less definitely formed crown and usually attaining a height of at least 10 feet.

UNEVEN-AGED STAND - A group of trees of a variety of ages and sizes growing together on a uniform site.

WATERSHED - The surrounding land area that drains into a lake, river or river system.

WILDLIFE HABITAT - The native environment of an animal, ideally providing all elements required for life and growth: food, water, cover, and space.

WILDLIFE TRAVEL CORRIDOR - Forested areas or other established vegetation used as travel lanes or buffer zones to connect larger stands of suitable wildlife habitat or prevent isolation of important foraging and nesting areas.

Holiday Lake Forestry Camp

FORESTRY CAMP TRAINS STUDENTS & TEACHERS

The *Appomattox Buckingham State Forest* is the training site for 100 teenage students and 50 educators and staff from throughout Virginia attending the ***Annual Holiday Lake Forestry Camp*** scheduled for the **third week of June .** Administered by the Virginia Department of Forestry, this unique camp provides an opportunity for students to experience sustainable natural resource management using hands-on, learn-by-doing activities.

Scholarships are also awarded to 20 classroom teachers and volunteer youth educators to attend Camp and participate with the students, gaining hands-on training in Project Learning Tree [PLT] activities. This unique training project results in more student participation in field classes using the PLT activities. The educators are able to attend classes with students adding to their knowledge and understanding of scientific, sustainable natural resource management.

For over half a century, Holiday Lake Forestry Camp has introduced young Virginians to the challenges, special skills and knowledge needed for managing the forest resources we use and enjoy every day. The Camp is designed for students who:

- Want to explore and experience activities in forestry and wildlife related careers
- Participate in Envirothons, forestry and wildlife judging teams or ecology clubs
- Have a special interest in **hands-on** learning about natural resource conservation

Camp is held at the Holiday Lake 4-H Education Center located within the 20,000 acre "outdoor classroom" on the *Appomattox-Buckingham State Forest.* Classes are taught in the woods on traditional forestry and wildlife management subjects by professional foresters, wildlife biologists, and resource specialists. The volunteer staff counselors represent the many sponsoring companies, agencies, organizations, as well as graduate students and Vo-Ag and Environmental Science teachers.

The Camp is financed through contributions and in-kind services from forest industry companies, Soil and Water Conservation Districts, Virginia Tech College of Natural Resources, Virginia Department of Game and Inland Fisheries, Virginia Forestry Education Foundation, the U.S. Forest Service, consulting foresters, conservation agencies and associations, and area businesses committed to educating tomorrow's leaders.

Campers are selected from nominations made by teachers, forestry and wildlife professionals, Soil and Water Conservation Districts, Envirothon Coaches, and 4-H and Scout Leaders. Campers must be between the ages of 13 and 16, in good academic standing and cannot be previous attendees. All students selected to attend Camp are awarded a scholarship to cover Camp expenses and materials. Campers pay a $35 registration fee to confirm their attendance and acceptance of the matching scholarship.

Our goal is to have these special students and teachers learn about our forests and how important they are to our quality of life; and have fun doing it. We provide hands-on courses that are exciting and unique to Forestry Camp, activities these teens would not experience anywhere else.

If you know of a deserving student or educator and would like to nominate them for attending Camp contact the Forestry Camp Coordinator at the VDOF Central Office in Charlottesville, telephone (434)977-6555 or complete a nomination form on our web site : **www.dof.state.va.us/hlfc.htm**.

EVALUATION

Virtual Tour of the Forest CD-ROM and Teacher's Guide

Please complete the following questionnaire to help us to determine the effectiveness of the *Virtual Tour of the Forest CD-ROM* and *Teacher's Guide*.

Name _____

Organization/School _____

Mailing Address _____

City/State/Zip _____

At which grade level(s) have you used the *Virtual Tour*? _____

In which subject areas have you used the *Virtual Tour*? _____

The continuing goal of quality and comprehensive environmental education is important to us now and as well as in the future. Please help us more effectively provide classroom assistance and educational programs by filling out the short questions below.

The *Virtual Tour* an effective teaching tool.

Strongly Agree ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Strongly Disagree

The *Teacher's Guide* is an effective teaching tool.

Strongly Agree ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Strongly Disagree

The resource materials are helpful additions to my lesson plans.

Strongly Agree ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Strongly Disagree

The students have gained an appreciation and understanding of Virginia's Forest Resources because of the material in the *Virtual Tour.*

Strongly Agree ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Strongly Disagree

Do you have any comments or suggestions?

_____

_____

☐ Check here if you are a trained PLT educator or facilitator.

☐ Check here if you are interested in receiving training in Project Learning Tree.

Thank you for your comments and continued support of environmental education.

Place
Stamp
Here

Virginia Department of Forestry

Attention: Conservation Education Coordinator

900 Natural Resources Drive, Suite 800
Charlottesville, Virginia 22903

WHAT IS…

…Project Learning Tree?

Project Learning Tree is an award-winning, interdisciplinary environmental education program for educators working with students in Pre-K through grade 12. PLT helps students gain awareness and knowledge of the natural and built environment, their place within it, as well as their responsibility for it. Project Learning Tree's curriculum is built around five major themes: diversity, interrelations, systems, structure & scale and patterns of change. PLT activities integrate the themes into all aspects of the standard Pre K-12 curriculum. They incorporate constructivism, whole language, cooperative learning, and problem-solving skills. Each activity guides the student through a process that begins with awareness, moves them toward understanding, enables them to challenge preconceived notions, and motivates them to seek constructive avenues for environmental action. The Project Learning Tree materials are provided free of charge when you attend an educator workshop in your area. For more information: www.plt.org.

…Project WILD?

Project WILD emphasizes wildlife because of its intrinsic and ecological values, as well as its importance as a basis for teaching how ecosystems function. Project WILD addresses the need for human beings to develop as responsible citizens of our planet. Two Activity Guides, an Introductory Guide and an Aquatic Guide, provide educators with the information needed to teach wildlife conservation and the importance of habitat. For more information: www.projectwild.org.

…Project WET?

Project WET's goal is to facilitate and promote awareness, appreciation, knowledge, and stewardship of water resources through the development and dissemination of classroom-ready teaching aids. Project WET is designed to teach students *how* to think, rather than *what* to think. Emphasis is on understanding the need for water by all water users (e.g., municipalities, farmers and ranchers, power suppliers, industry, recreationists, and fish and wildlife. For more information: www.montana.edu/wwwwet.

…VA Naturally?

VA Naturally provides a gateway to statewide environmental education resources including information about volunteer opportunities, educational classes, places to visit, community events, watershed maps, lesson plans, and recreational activities. It recognizes exemplary efforts and makes it easy for schools and communities to access resources and deliver environmental education programs. VA Naturally also links public and private groups together to reach more citizens from all sectors of the Commonwealth to promote a better understanding of scientific and economic challenges. For more information: www.vanaturally.com.

Help Us Protect Our Forests

In Virginia, 99% of wildfires are caused by people. Each year wildfires cost hundreds of thousands of dollars to control and protect homes. Each year, approximately 2,000 fires burn an average of 10,000 acres of forest land. People are injured or killed, buildings are destroyed, and damage to the forest and environment occurs.

Here are a few basic tips to minimize forest fire risk:

- Obey forest fire laws
- Do not leave any fire unattended
- Report acts of arson to fire department, police, sheriff or forestry personnel
- Extinguish smoking materials in deep ashtrays; be sure they are "dead-out"
- Hold matches until cold
- Use metal containers for ashes or charcoal; keep in container for 48 hours before dumping
- Store gasoline and flammable materials safely
- Teach children safe camping behaviors

Wildfire, forest fires, outdoor fires, which occur during hot, dry, windy periods can be very destructive of forests, wildlife habitats and houses. The term "wildfire" usually brings to mind television pictures of homes being threatened by a raging fire out of control. Virginia's 4:00 p.m. burning law goes into effect each **February 15 and extends through April 30.** During this time, outdoor fires are unlawful before 4:00 p.m. Contact local foresters for information or visit our web-site.

The number of homes being built in or near forested areas is increasing rapidly in Virginia. When fire occurs around a home, it often extends into the forestland, threatening other homes and forest resources. Here are some home fire safety precautions:

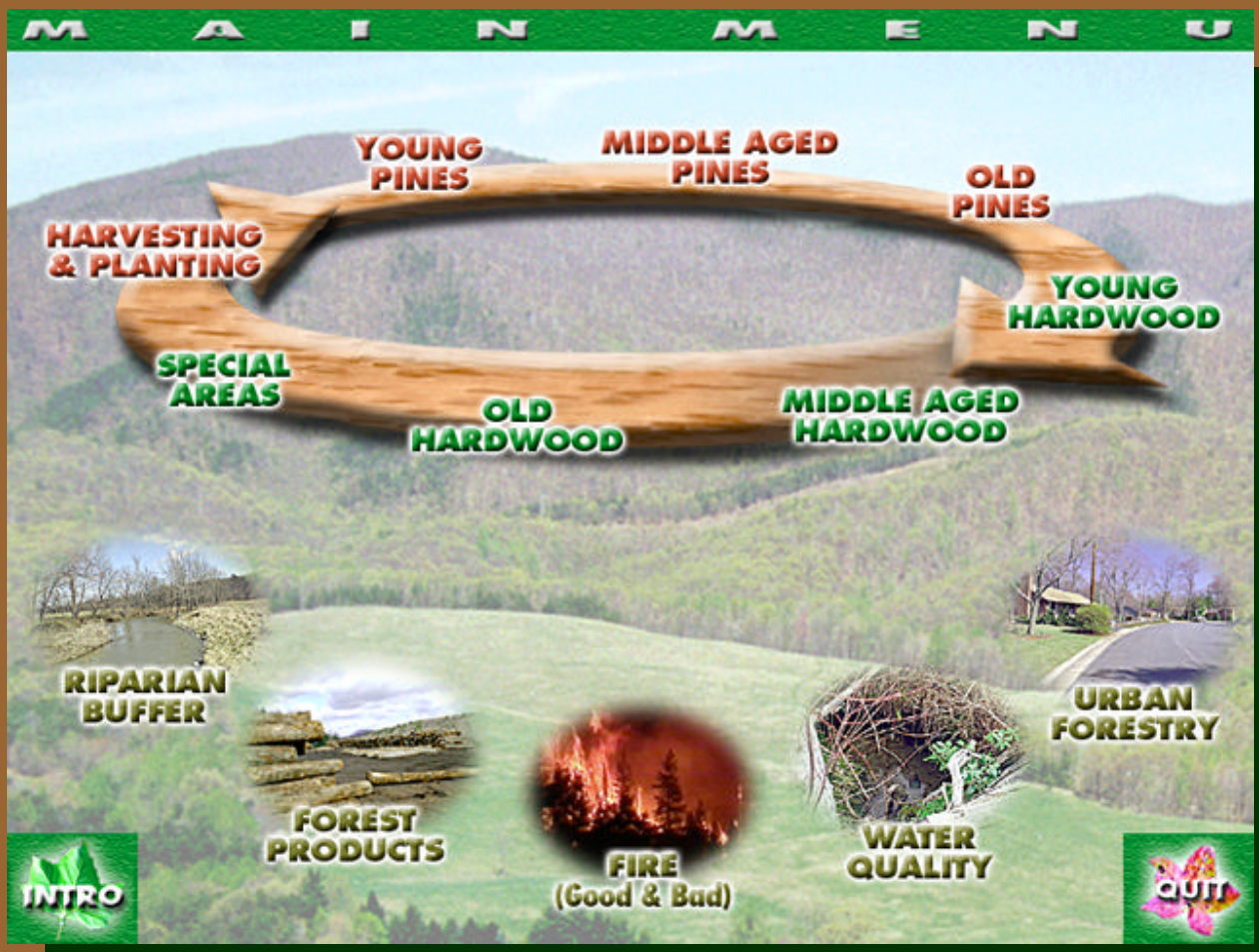
- Clear an area at least 30 feet wide around all structures
- Your driveway should be able to accommodate fire fighting equipment
- Have house address clearly displayed
- Keep leaves and debris cleared from under decks and porches
- Roofs should be made of fire-resistant materials
- Remove leaves and pine needles from the roof and gutters so they will not be set on fire by blowing sparks or embers
- Have accessible outside water spigots and at least 100 feet of garden hose
- If fire becomes life threatening or fire officials give evacuation orders, leave immediately.

Protect Our Forests!

Remember...

Only You Can Prevent Forest Fires!

Virtual Tour of the Forest



www.dof.state.va.us